

THE POLAR TIMES

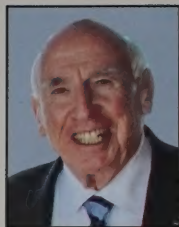


AMERICAN POLAR SOCIETY

APS CELEBRATES 80TH ANNIVERSARY

See Page 3

January 2016



President's Message

Dear Fellow American Polar Society Members:

Happy New Year! I hope all of you and your families had a safe and most pleasant holiday season and that the New Year has started off well for each of you!

This will be my last message to you since I intend to step down from the presidency of APS as soon as a new president is elected during the next several months. It has been a most interesting and rewarding four-plus years. I have very much enjoyed being, and feel greatly honored to have been, your president. I also have truly appreciated the loyal support that I have received from so many of you.

The last several years have been ones we can all be proud of. APS has held two very

successful climate change-related symposiums — the first at Woods Hole, Massachusetts, during the fall of 2013, and the second, just months ago, at the famed Scripps Institution of Oceanography in La Jolla, California. The latter, in particular — themed “The Role of the Polar Oceans in Global Climate Change” — was our crowning glory, as will be discussed in detail throughout this issue of *The Polar Times*. It should make APS well known as we step forth to take our proper place within the global climate change scientific community. The speakers were some of the best known and most well-regarded in the scientific community, and the symposium was attended by over 150 during the two days that sessions were scheduled. I am happy to state that the APS treasury is in excellent shape and more than sufficient to meet our needs in the near term. It is

now up to a dynamic new group of governors, and a new president with a vision for APS, to build from here!

One major concern before I close: APS's membership has steadily decreased. It has now reached a point, in my opinion, that the principal objective of the new Board of Governors, president, and all APS members must be a maximum effort to actively recruit to rebuild our membership base. Major emphasis should be on the recruitment of younger members to our august ranks. The future of our now 82-year-old organization depends on it!

My warmest regards to you all,

Alfred Scott McLaren
Captain, USN (Ret.), PhD

Alfred Scott McLaren
President, APS

Membership Letter

Greetings from Maine! It is winter in New England, although this season is definitely more mild than it was last year at this time! The APS Membership Center has had a busy year with new members coming in and current members relocating to new addresses and new adventures. We appreciate all members who took time to let APS know of any new contact information or with any difficulties with the timely arrival of *The Polar Times*. Remember, we can always be reached through regular mail or at aps@bluestreakme.com or through our website at <http://www.americanpolar.org>. If you know of fellow polar enthusiasts who you think might be interested in APS, please let us know, and we will contact them. A gift membership is also a great way to introduce someone to the society and

get them going! Please help us to keep the organization vibrant. Attracting and maintaining existing memberships is one way to do so.

As we look forward to 2016, I thank you once again for the opportunity and honor to be your membership chair. I have always said that the strength of the American Polar Society is its members. Merry Christmas and Happy New Year!

Charles Lagerbom
APS Membership Chair

Send membership requests/
and contributions to:
Charles Lagerbom
Membership Chair
PoBox 300, Searsport, ME 04974

American Polar Society

The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Regular membership dues are \$25 a year and entitle members to receive *The Polar Times* twice a year. The American Polar Society is classified as a tax exempt organization under Sec 501(C)3 of the IRS Code. For more information about the American Polar Society, contact Charles Lagerbom, APS Membership Chair, at aps@bluestreakme.com

FOUNDER • August Howard

PRESIDENT • Capt. Alfred S. McLaren, USN (Ret.), PhD

VICE PRESIDENTS

Lawson Brigham, PhD • Robert Flint • Denise Landau

SECRETARY • James W. Collinson, PhD

TREASURER • Lynn R. Everett

MEMBERSHIP CHAIR • Charles Lagerbom

BOARD OF GOVERNORS

John Spletstoeser, Chair • Sheldon Bart • John Behrendt, PhD

Cliff Bekkedahl • Lawson Brigham, PhD • Richard L. Chappell, PhD

James W. Collinson, PhD • Sylvia Earle, PhD • Patty Elkus

David Elliot, PhD • Lynn R. Everett • Elaine Hood • Denise Landau

Merlyn Payne • Dr. Michele E. Raney, MD • Will Steger • Mead Treadwell



The Polar Times

JANUARY 2016, Vol. 3, No. 28

MANAGING EDITOR: Capt. Cliff Bekkedahl, USN (Ret.)

631.267.7646 • cv1957@optonline.net

PRODUCTION EDITOR: Charlotte Sinclair

919.260.0031 • sinclairca@gmail.com

EDITORIAL BOARD

Sheldon Bart • Dian Belanger • Lawson B. Brigham

Charles Lagerbom • Dave Norton

Merlyn Payne • Jeff Rubin • John Spletstoeser

CONTRIBUTING EDITORS

Billy-Ace Penguin Baker, RMC, USN (Ret.)

Peter Anderson

EDITOR EMERITUS

Capt. Brian Shoemaker, USN (Ret.)

It is with deep regret ...

... that we inform the members of The American Polar Society that our Chairman of the Board of Governors, John Spletstoeser, passed away on Monday, January 25, 2016, at age 82.

John — for so long, the wind beneath our wings — will be sorely missed as a friend and polar colleague. John's mobility has been limited for the past year or so, but from his hometown in Waconia, Minnesota, he played a major role in planning and organizing the recent Scripps-APS Symposium; and a quick look at his many bylines in this issue of *The Polar Times* will tell you how important a role he has played in the publishing of this journal.

Our July 2016 issue of *The Polar Times* will be dedicated to John and his stellar career in the polar reaches of the world. ¶

American Polar Society Symposium

3-6 November 2015

Held at Scripps Institution of Oceanography
University of California, San Diego

Article by Cliff Bekkedahl, Managing Editor • Photos by Anne Doubilet

Theme: “The Polar Oceans and Global Climate Change.” The verdict? Unanimous — a smashing success!

World-class presenters, awesome modern facilities and equipment. Even so, at the morning and afternoon coffee breaks, you were drawn to the patio overlooking the sandy beaches of the Pacific Ocean to wonder if you should return to the lecture room or grab a surfboard and join the gang waiting to catch the “big” wave that was due any moment.

Who made this so? Well, the list is long and familiar to most of you and topped by our tireless president, Captain Alfred “Fred” McLaren, USN (Ret.), and Board Chairman John Splettstoesser, all the officers of the APS, and a special few of our membership who have always been ready to answer the call — the 20 percent who do 80 percent of the work.

This was a partnership effort with our co-host, Scripps Institute, so ably and graciously led by Margaret Leinen and her splendid staff.

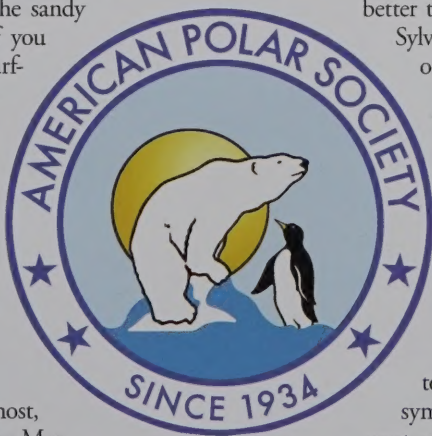
At the Wednesday morning kick-off hour, all preparations were set, all attendees were assembled, welcoming speeches — wisely brief — were presented by Fred McLaren and Margaret Leinen and finished on-clock. Dr. Kelly Falkner, Division Director of Po-

lar Programs, National Science Foundation, set the stage for what is new in U.S. polar programs, giving us some idea of the challenges and breakthroughs of the extensive research conducted by the U.S. in polar regions.

Yet, something was missing — a fuse to be lit — and who better to provide this spark but keynote speaker Dr. Sylvia Earle, world-renowned oceanographer and ocean advocate. (Many readers may not know that Dr. Earle is a member of the Board of Governors of the American Polar Society.)

Dr. Earle began her remarks from the customary position behind a large and imposing podium but, shortly thereafter, she abandoned her notebook and moved out front, close to her audience, and gave us an address that she had refined from countless speeches and lectures she had offered students and counterparts in the academic world, to international oceanographic and government symposiums and conferences, and in her writings past and current.

Clearly she felt herself among friends and colleagues, and her message was clear — no notes, no PowerPoint presentation. “Here’s the way it is, and something has to be done, now!” The oceans are warming, the climate is changing, glaciers and massive ice sheets north and south are melting or being under-





Kelly Falkner, speaker



Norman Augustine, distinguished banquet speaker



Denise Landau, Board of Governors

cut or losing their anchor points. The evidence is overwhelming and, yes, must be further studied and refined, but continued inaction is neither a policy nor a rational alternative. "We must do some big things soon," she said. "So far all we have done is take, take, take from nature — exploit and consume. This has to be turned around."

Backing her idea of instant action, Dr. Earle recommended that a step forward would be to dramatically expand national or international jurisdiction of the oceans. Right now, something close to 64 percent of the oceans lie beyond any form of jurisdiction. A start?

[Ed note: As this is written, the Paris Conference on Climate Change is drawing to a close. Will the voices of Dr. Earle and her cohorts have been heard? We will soon learn.]

It would be beyond the reach of *The Polar Times* to abstract and present the substance of each of our fifteen prestigious speakers who filled the ambitious two-day agenda, but a couple quotes catch the seriousness and the urgency of their observations and their assessment of the status of the oceans in the era of man's impact on the changing world climate — essentially, the 150 years of industrialization and the discharge of CO₂ and other harmful gases into the atmosphere.

Walter Munk, Emeritus Professor of Geophysics at Scripps and recently dubbed "Einstein of the Oceans" by *The New York Times*, cautioned that the Greenland Ice Sheet was melting at a much faster rate than anticipated and could result in a sea level rise approaching 22 feet.

Further, he postulated that the Arctic Sea could be ice-free within the next 20 years, with all of the warming traceable to

abnormal amounts of CO₂ in the atmosphere — a la the "greenhouse effect."

Lynne Talley, Professor of Physical Oceanography at Scripps, reminded attendees that almost all CO₂ in the atmosphere is eventually absorbed into the oceans, affecting, among other things, the pH of the water and also water temperatures.

Along with other colleagues in the field, Professor Talley has concluded that warm-water upwellings are melting Antarctic ice shelves and interior ice sheets — underwater anchor points that allow accelerated movement of the ice sheets into the seas, which then break off and melt in the relatively warmer ocean water.

Prof. Talley offers that this process can only accelerate as more CO₂ is pumped into the atmosphere. "It's [CO₂] up there now and will eventually enter the oceans. And even if the addition of CO₂ to the atmosphere were instantly stopped, it would take the oceans decades to absorb the amount of CO₂ extant to acceptable levels."

James E. Hansen — formerly director of Goddard Institute for Space Studies and currently adjunct professor at Columbia University's Earth Institute — created a stir many decades ago with his testimony to Congress, raising concerns about climate change. For our Symposium, he chose to offer some thoughts of "what to do." Specifically, the energy needs of China and India for the remainder of the century will require continued use of carbon fuels unless changing of energy sources is forced upon them. How? Pricing. Increase the price of carbon until the alternatives emerge. Phew! That might be tough to sell in Beijing and Mumbai, but it could be part of the solution.



The foregoing are just samples of the messages carried by each of the speakers — urgency was a constant — the time is now to do something meaningful, and inaction is a policy decision, the worst of all options.

The social side of the Symposium absorbed what little energy remained in an attendees' tank at the end of the day. Tuesday, 3 November, was arrival day for most participants, and a "Welcome" cocktail party hosted by Scripps softened the hard edges of a long day of travel for many. Familiar faces appeared, acquaintances made from previous APS symposiums were renewed, and the awesome spread of finger foods offered by our host made any thoughts of going out for dinner irrelevant.

At the close of our first day of lectures, Patty and Rick Elkus, in the home of Professor and Mrs. Walter Munk, hosted a cocktail party honoring the organizers of the symposium and included the fifteen distinguished speakers, their wives and guests. The Munk home is a magnificent example of California living. Situated high in the hills of La Jolla, overlooking the Pacific, it featured a decor that clearly portrayed the home of life-long travelers to exotic regions of the world.

Our third and last night, we celebrated our success with a banquet at the La Jolla Shores Hotel. Readers of the July issue of *The Polar Times* will recall our lead article in which recognition was extended to major donor, sponsors, and supporters of the then-forthcoming Symposium.

Banquet night was another opportunity to offer our gratitude to the special

(CONTINUED ON NEXT PAGE)



Left to right, Jim Collinson, Marilyn Paine, and Avery Russell

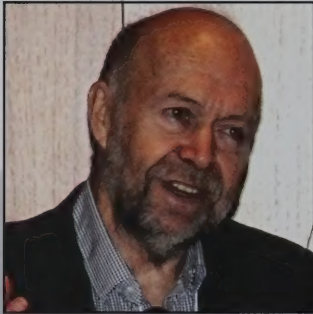




Walter Munk, speaker, with wife Mary Munk



Sylvia Earle, Board of Governors



Jim Hansen, speaker



Patty Elkus, Board of Governors

few who reached deep into their pockets and made contributions, without which there would not have been a symposium. Leading this list, our angel Avery Battle Russell, followed closely by the world-renowned Swiss watchmaker firm, CLERC Watches, and its dynamic and activist CEO Gerald Clerc, who has founded the international organization called Open Waters Heroes.

There are other unsung "heroes" who have dedicated their lives to protecting the oceans and the life forms therein, and Gerald Clerc believes they need and deserve recognition and support for their work and for their inspiration to the generations that will succeed them.

Up North...

The APS always has friends up north, and we welcomed the participation of Arctic and Canadian adventure travel organizers, Adventure Canada. Their display booth was an active site at every break in the daily program.

And last but not least, our close friends at Kane Lodge Foundation, who are always there for us.

Recognition played a major role in the coffee and dessert phase of the evening. By count, there were twelve awards announced, nine new honorary members, and three Honorary Service awards.

Highlighting the awards phase was the presentation by CLERC Watches CEO Gerald Clerc of two of their magnificent wrist watches to two scientists

and symposium presenters: Professor Emeritus Gerald Kooyman for his lifetime work with the Emperor Penguins of Antarctica and Jacqueline Grebmeier, University of Maryland, for her work on marine ecosystems in the Arctic

Closure

The final event of banquet night was a speech by that distinguished American, Norman R. Augustine, retired chairman and chief executive officer of Lockheed Martin Corporation.

As a personal observation, it is unfortunate that his message was delivered at the close of a busy day and to an audience a tad loggy from fine wine and splendid cuisine.

What he had to say was extremely important, and the symposium audience was the ideal recipient for the wisdom he imparted and the experiences he shared. He acknowledged the importance of the work that was being done in the field of climate change by Scripps, The American Polar Society, those present, and those in the far-flung polar reaches. But his concern was that, as he phrased it, America was "dis-investing" in science. Yes, good work was still being done, but he believed the trend was in the wrong direction and had to be reversed if existential problems such as climate change were to be contained.

Summary

For those who were unable to attend the Symposium, an attractive booklet was prepared for the event and is available in its entirety on the American Polar Society website (www.americanpolar.org) at the direct link of http://www.americanpolar.org/wp-content/uploads/2015/11/PolarSymposium_4_small.pdf.

The foregoing barely scratches the surface in terms of recognition for those who made the event a success by every measure. Some have been recognized, and the following, in a shout-out format, also deserve to be saluted in this account:



Adventure Canada display booth with Stefan Kindberg and Sheryl Saint

■ **Merlyn Paine** and **Jim Col-
linson**, APS stalwarts and always on
scene to make things happen.

■ **Elaine Hood**, who provided
those splendid Antarctic maps in the
goodie bags. British Antarctic Survey
provided a special map that featured
both polar regions.

■ **Charlotte Sinclair** for graphics
and text support...ever-ready.

■ **Sheldon Bart**, long but fruitful
hours spent fund raising.

■ The Scripps team who got things
done: **Blaize Mekinna**; **Donna
Shabke**; **Mario Guilera**; **Giuseppe**,
caterer extraordinaire; and of course,
Patty and Rick Elkus, out front all
the time.

Board of Governors meeting

Finally, and as in the past, the sympo-
sium offers an opportunity on check-out
day to hold a Board of Governors Meet-
ing. With a quorum present, the Board
discussed the following subjects:

Financial status — Sound, but ex-
penses incurred for the symposium were
all not accounted for, so an accurate state-
ment was not provided, although later in-
formation showed that all expenses were
covered and a generous balance existed to
help the Society's accounts in 2016.

Leadership — A search for a new slate
of officers was in order. Both **Fred Mc-
Laren** (president) and **John Splettstoesser**
(BofG chairman) have expressed their
desire to resign their offices. Both have
agreed to stay on until eligible relief is
elected.

New officers — **Cliff Bekkedahl** was
nominated and approved as a member of
the Board of Governors, and **Lynn R. Ev-
erett** has accepted the assignment of Treas-
urer for The American Polar Society.

Board resolutions — The Board
unanimously agreed that four commit-
tees be established and a chairman as-
signed for each.

- Fund raising
- Membership
- Nominating
- Strategic planning

The Board further agreed, unani-



"CLERC Watches" award-watch recipients Gerald Kooyman and Jacqueline Grebmeier



APS President Fred McLaren stands with CLERC Watches CEO Gerald Clerc as they examine a scale model of the deep-diving submersible "Orcasub" (incidentally, dubbed as such by McLaren's wife, Avery Russell). McLaren was senior pilot of the Orcasub's prototype, the "Super Aviator" submersible, from 2003 to 2015 and assisted with "underwater flight testing." According to McLaren, the submersible is "flown like an airplane under water to several thousand meters." Built by Nuytco of Vancouver, B.C., each individual craft is built to order, with each client or organization choosing their desired depth capability.

mously, that a new slate of officers and
BOG members is a priority and that mea-
sures and means to increase our member-
ship is essential to the future of the APS.

The Board called for existing members
who may be interested in playing a leader-
ship role in the APS to make themselves
known and reminds all members that

the APS is a volunteer organization and
a grouping of diverse individuals with a
common interest in polar affairs. Come
forward and help ensure the future of
APS. ¶

Medals and Certificates Awarded at the 80th Anniversary Symposium

This is a list of the members of the American Polar Society who were recently recognized in November 2015 at the 80th Anniversary Symposium — held at the Scripps Institution of Oceanography in La Jolla, California — for their service and achievements in polar affairs and who have been designated either as HONORARY MEMBERS or who have received HONORARY SERVICE AWARD certificates. These men and women are drawn from a broad spectrum of polar activity — scientific, academic, military, explorers, builders and others who have shared the dreams, challenges and wonderment unique to the polar world and who have served and contributed in the polar environment in very special ways.

2015 APS Honorary Members

Norman R. Augustine — National corporate figure (retired Chairman and Chief Executive Officer, Lockheed Martin Corporation), distinguished DOD Senior Executive, and chair of U.S. Antarctic program Blue-Ribbon Panel, and space commissions

Peter Anderson — Antarctic; APS leader and bridge from the founder, August Howard, to the new and revamped Society

Captain Lawson W. Brigham, USCG (Ret.), PhD — Celebrated Coast Guard icebreaker commander and Arctic policy shaper; signer of the (2008) AGS Flier's and Explorer's Globe as captain of *Polar Sea*, the first ship to reach the ends of the global ocean (1994); current Distinguished Professor at University of Alaska Fairbanks

Dr. Julian A. Dowdeswell — Director, Scott Polar Research Institute; leading European/international glaciologist; UK Polar Medal (international nominee)

Dr. Gerald "Jerry" Kooyman — Eminent Antarctic researcher; pioneering studies on seals and emperor penguins (SIO distinguished scientist)

Captain Alfred Scott McLaren, USN (Ret.), PhD — Celebrated Arctic and Cold War nuclear submariner commander; President of The Explorers Club and current APS President; holder of The Explorers Medal

Dr. Walter Munk — Eminent oceanographer of the 20th century; Heard Island sound experiments (SIO distinguished scientist)

Avery Battle Russell — Distinguished philanthropic institution administrator and humanitarian; extraordinary and dedicated APS supporter

Captain Brian Shoemaker, USN (Ret.) — Extensive Arctic and Antarctic flying and naval command experience; key executive director who reenergized APS at the end of the 20th century (12-15 years)

APS Honorary Service Award

(an honor first presented to
Mort Turner)

Patty Elkus — Distinguished San Diego community and Scripps supporter; APS Board of Governors; strong supporter of APS

Charles Lagerbom — Past Antarctic Society president; long-term APS membership chair; Antarctic research experience; historian and author of polar literature.

Charlotte Sinclair — 24 years of service to *The Polar Times* (worked with Brian Shoemaker to bring back TPT and has continued to date); currently also maintains the APS web site and is available for special projects involving graphic design ¶



Global Warming 'Hiatus,' Long a Puzzle, Is Challenged by a New Study

The New York Times, 5 June 2015, by Justin Gillis—Scientists have long labored to explain what appeared to be a slowdown in global warming that began at the start of this century as, at the same time, heat-trapping emissions of carbon dioxide were soaring. The slowdown, sometimes inaccurately described as a halt or hiatus, became a major talking point for people critical of climate science.

Now, new research suggests the whole thing may have been based on incorrect data.

When adjustments are made to compensate for recently discovered problems in the way global temperatures were measured, the slowdown largely disappears, the National Oceanic and Atmospheric Administration declared in a scientific paper published Thursday. And when the particularly warm temperatures of 2013 and 2014 are averaged in, the slowdown goes away entirely, the agency said.

"The notion that there was a slowdown in global warming, or a hiatus, was based on the best information we had available at the time," said Thomas R. Karl, director of the National Centers for Environmental Information, a NOAA unit in Asheville, N.C. "Science is always working to improve."

The change prompted accusations on Thursday from some climate-change deniers that the agency was trying to wave a magic wand and make inconvenient data go away. Mainstream climate scientists not involved in the NOAA research rejected that charge, saying it was essential that agencies like NOAA try to deal with known problems in their data records.

At the same time, senior climate scientists at other agencies were in no hurry to embrace NOAA's specific adjustments. Several of them said it would take months of discussion in the scientific community to understand the data corrections and come to a consensus about whether to adopt them broadly.

Some experts also pointed out that, depending on exactly how the calculation is done, a recent slowdown in global warming still appears in the NOAA temperature record, though it may be smaller than before. "These trends are very sensitive to the time periods you use to compute them," said Gerald A. Meehl, a senior scientist at the National Center for Atmospheric Re-

search in Boulder, Colo.

Scientists like Dr. Meehl never accepted the notion, put forward by some climate contrarians, that the slowdown disproved the idea that global warming poses long-term risks. But they said they believe it is real and demands an explanation.

A leading hypothesis to explain the slowdown is that natural fluctuations in the Pacific Ocean may have temporarily pulled some heat out of the atmosphere, producing a brief flattening in the long-term increase of surface temperatures.

NOAA is one of four agencies around the world that attempts to produce a complete record of global temperatures dating to 1880. They all get similar results, showing a long-term warming of the planet that scientists have linked primarily to the burning of fossil fuels and the destruction of forests. A huge body of physical evidence — notably, that practically every large piece of land ice on the planet has started to melt — suggests the temperature finding is correct.

For many decades, into the mid-20th century, the main measurements came from sailors hauling up buckets of seawater and plopping thermometers into them.

Yet the temperature record is plagued by many problems: thermometers and recording practices changed through time, weather stations were moved, cities grew up around once-rural stations, and so on. Entire scientific careers are devoted to studying these issues and making corrections.

In their paper published online Thursday by the journal *Science*, and in interviews, scientists at NOAA said that in coming months they would roll out new versions of their temperature record that incorporate numerous improvements.

The previous record showed that temperatures from 2000 to 2014 had warmed at about two-thirds the rate of temperatures from 1950 to 1999. In the new analysis, the rate of warming in those two time periods is basically identical.

NOAA said the improvements in its data set included the addition of a huge number of land measurements from around the world, as a result of improving international cooperation in sharing weather records. But

the disappearance of the slowdown comes largely from adjustments in ocean temperatures.

The ocean covers 70 percent of earth and thus the temperature at its surface has a huge influence on the overall record. Yet ocean measurements in particular are rife with difficulties.

For many decades, into the mid-20th century, the main measurements came from sailors hauling up buckets of seawater and plopping thermometers into them.

The buckets varied, the thermometers varied, and some of the sailors were more diligent than others about following instructions. On average, scientists believe, the water tended to cool off a bit before the temperature was recorded.

NOAA had long believed the data glitches from the buckets had largely disappeared after World War II, but new information suggests that bucket measurements continued on some commercial vessels long after the war. The new NOAA data set attempts to correct for this and other problems in the ocean records.

The Cato Institute, a libertarian think tank in Washington that is critical of climate science, issued a statement condemning the changes and questioning the agency's methodology.

"The main claim by the authors that they have uncovered a significant recent warming trend is dubious," said the statement, attributed to three contrarian climate scientists: Richard S. Lindzen, Patrick J. Michaels and Paul C. Knappenberger.

However, Russell S. Vose, chief of the climate science division at NOAA's Asheville center, pointed out in an interview that while the corrections do eliminate the recent warming slowdown, the overall effect of the agency's adjustments has long been to raise the reported global temperatures in the late 19th and early 20th centuries by a substantial margin. That makes the temperature increase of the past century appear less severe than it does in the raw data.

"If you just wanted to release to the American public our uncorrected data set, it would say that the world has warmed up about 2.071 degrees Fahrenheit since 1880," Dr. Vose said. "Our corrected data set says things have warmed up about 1.65 degrees Fahrenheit. Our corrections lower the rate of warming on a global scale." ¶

Greenland Is Melting Away

The New York Times, by Coral Davenport, Josh Haner, Larry Buchanan and Derek Watkins, **ON THE GREENLAND ICE SHEET**—The midnight sun still gleamed at 1 a.m. across the brilliant expanse of the Greenland ice sheet. Brandon Overstreet, a doctoral candidate in hydrology at the University of Wyoming, picked his way across the frozen landscape, clipped his climbing harness to an anchor in the ice and crept toward the edge of a river that rushed downstream toward an enormous sinkhole.

If he fell in, "the death rate is 100 percent," said Mr. Overstreet's friend and fellow researcher, Lincoln Pitcher.

But Mr. Overstreet's task, to collect critical data from the river, is essential to understanding one of the most consequential impacts of global warming. The scientific data he and a team of six other researchers collect here could yield groundbreaking information on the rate at which the melting of the Greenland ice sheet, one of the biggest and fastest-melting chunks of ice on Earth, will drive up sea levels in the coming decades. The full melting of Greenland's ice sheet could increase sea levels by about 20 feet.

"We scientists love to sit at our computers and use climate models to make those predictions," said Laurence C. Smith, head of the geography department at the University of California, Los Angeles, and the leader of the team that worked in Greenland this summer. "But to really know what's happening, that kind of understanding can only come about through empirical measurements in the field."

For years, scientists have studied the impact of the planet's warming on the Greenland and Antarctic ice sheets. But while researchers have satellite images to track the icebergs that break off, and have created models to simulate the thawing, they have little on-the-ground informa-

tion and so have trouble predicting precisely how fast sea levels will rise.

Their research could yield valuable information to help scientists figure out how rapidly sea levels will rise in the 21st century, and thus how people in coastal areas from New York to Bangladesh could plan for the change.

Each year, the federal government spends about \$1 billion to support Arctic and Antarctic research by thousands of scientists like Dr. Smith and his team. The agency officials who receive that money from Congress, including the directors of the National Science Foundation, NASA and the National Oceanic and Atmospheric Administration, say the research is essential for understanding the changes that will affect the world's population and economies for more than a century.

But the research is under increasing fire

50 National Science Foundation grants. On Oct. 13, the committee subpoenaed scientists at the National Oceanic and Atmospheric Administration, seeking more than six years of internal deliberations, including "all documents and communications" related to the agency's measurement of climate change.

Any cuts could directly affect the work of Dr. Smith and his team, who are supported by a three-year, \$778,000 grant from NASA, which must cover everything, including researchers' salaries, flights, food, computers, scientific instruments and camping, safety and extreme cold-weather gear. Every scientist, Dr. Smith said, is keenly aware that the research costs "a tremendous amount of taxpayer money."

Getting Ready

In July, Dr. Smith's team arrived in Kangerlussuaq, Greenland, a dusty outpost of 512 people on the island's southwest coast, which serves as a base for researchers to prepare for fieldwork on the ice sheet.

The scientists were excited but anxious as they prepared to travel inland by helicopter to do the fieldwork at the heart of their research: For 72 hours, every hour on the hour, they would stand watch by a supraglacial watershed, taking measurements — velocity, volume, temperature and depth — from the icy bank of the rushing river.

"No one has ever collected a data set like this," Asa Rennermalm, a professor of geography at the

Rutgers University Climate Institute who was running the project with Dr. Smith, told the team over a lunch of musk ox burgers at the Kangerlussuaq airport cafeteria.

Taking each measurement was so difficult and dangerous that it would require two scientists at a time, she said. They would have to plan a sleep schedule to ensure that a group was always awake to do the job. Everyone knew the team would be



Lakes on the surface of the Greenland Ice Sheet are common in the northern summer, as temperatures allow melting in the southern part of the ice sheet where much of it is south of the Arctic Circle. If crevasses and moulins are present, the meltwater will drain and form a lubricating base on bedrock and enhance movement of the ice to the coast. Some lakes collect sediment as melting occurs, and drainage channels as shown in the photo transport whatever is on the surface to the lake, where sediment content includes micrometeorites that concentrate in a process resembling a placer deposit. Photograph by John Spletstoeser in June 1975 from aircraft at about 500 feet altitude.

by some Republican leaders in Congress, who deny or question the scientific consensus that human activities contribute to climate change.

Leading the Republican charge on Capitol Hill is Representative Lamar Smith of Texas, the chairman of the House science committee, who has sought to cut \$300 million from NASA's budget for earth science and has started an inquiry into some

working just upriver from the moulin — the sinkhole that would sweep anyone who fell into it deep into the ice sheet.

The morning before their departure, the team gathered in a hangar to pack gear and provisions: tents, collapsible metal cots, generators, pickaxes, crampons, freeze-dried meals, a wealth of scientific instruments, vials for snow, ice and water samples, and a cooler to bring those samples back to labs in the United States.

They also took toilet paper and several plastic bottles, each labeled in marker with a large letter “P.” The bottles were for the scientists to urinate in should they not want to go outside in below-freezing nighttime temperatures to the open-air “toilet” on the ice. Afterward they would serve a practical purpose, as hot water bottles tucked into sleeping bags.

Not least, they packed a pair of 10-pound aerial drones, to map the icy watersheds.

Every item was weighed and reweighed since the helicopter could carry no more than 360 kilograms — 794 pounds — and would have to make several trips. Dr. Smith’s NASA grant covered 10 hours of helicopter flight time, including the pilot’s fee, at a cost of about \$5,000 per hour.

The scale brought bad news: The gear was far too heavy. “Now we start getting rid of things,” Dr. Smith said grimly as he and the team began jettisoning extra food, utensils and blankets. They scaled down to the barest essentials and anxiously reweighed the items: 359.9 kilograms.

At last the helicopter took off with the team’s gear hanging from an attached net sling. The scientists gazed at the seemingly endless surface of the ice beneath the chopper, spreading in all directions, threaded with aquamarine rivers and lakes. After a 40-minute flight, the pilot cautiously bounced the helicopter on the ice, making sure it was hard enough to land on.

Stepping out, the scientists were hit by the cold of the Greenland summer — the temperature ranged from 26 to 40 degrees while they were there — a constant wind and the glare of the sun.

As the researchers began to set up camp, Mr. Overstreet, the University of Wyoming doctoral student, headed toward the river, silent as it sliced through the ice. More than any other member of the team, the success of the mission rested on his shoulders.

Mr. Overstreet, 31, who grew up kayaking and rafting in Oregon, had designed the complex rope-and-pulley system —

modeled on swift-water boat rescue systems — that would be crucial to gleaning data from the treacherous waters. Before coming to Greenland, he spent months refining and practicing his rope system on rivers in Wyoming.

On the Ice

The team soon got to work. A helicopter pilot flew two of Mr. Overstreet’s colleagues, Mr. Pitcher and Matthew Cooper, both of the University of California, Los Angeles, across the 60-foot river. On the opposite bank they drilled into the ice, attached an anchor and harnessed themselves to it for safety. They attached a nylon line to the anchor, with the rest of the line coiled in a heavy bag.

Now came the crucial part: The men took turns hurling the bag across the river, but it repeatedly fell into the water. After an anxious half-hour, Mr. Cooper finally got the rope across. Mr. Overstreet caught it and began setting up the rope-and-pulley system he had been testing for so long.

Taking each measurement was so difficult and dangerous that it would require two scientists at a time — Everyone knew the team would be working just upriver from the moulin — the sinkhole that would sweep anyone who fell into it deep into the ice sheet.

Farther upstream, Dr. Smith cast what looked like three small, round life preservers into the river. At \$3,000 each, they were equipped with waterproof computers, GPS and sonar depth technology, all to beam back information about the river’s elevation, speed, depth and more. But the drifters were on kamikaze missions. After sending back the measurements, they would be swept into the moulin.

“That’s 3,000 taxpayer dollars, going down the hole,” Dr. Smith said.

On the edge of the camp, Johnny Ryan, a doctoral candidate in geography at Aberystwyth University in Wales, launched an airplane-shaped drone from a sling-shot-like device, then guided it over a nearly 75-square-mile area. But then the drone went silent. “It stopped talking to me, and

now it’s crashed in the wilderness,” Mr. Ryan said.

Mr. Ryan, who wore a hot-pink knit cap and purple sunglasses that set off his bright red beard, launched his backup drone. Feeling stressed, he monitored its flight nervously as the hours rolled by, drinking cups of tea to keep warm.

At the riverbank, Mr. Overstreet and Mr. Pitcher started the data collection by clipping a computer device that looked like a boogie board to the line running across the river. Every hour they sent it back and forth to measure the water’s depth, velocity and temperature.

But as the day stretched into night, the device’s battery, sapped by the cold, began to die. By now the sun had dropped lower, filling the sky with a spectacular orange glow. The scientists were worried — the death of the battery would mean the death of their mission.

An idea occurred to Mr. Overstreet. He found a roll of heat-reflecting silver sheeting at the camp and wrapped it around the boogie board battery. During the next run across the river, it stayed alive.

But the battery continued to wane, so Mr. Pitcher pulled out gel hand warmers from his gloves and tucked them into the battery’s silver jacket. Success. The battery stayed warm and functional.

For the rest of their time on the ice, the scientists would have to ration the hand warmers. Saving the life of the battery would save the mission to record the first comprehensive on-the-ground, empirical data on the flow of a river off the ice sheet.

They might even learn, Dr. Smith said, that the water is refreezing within the ice sheet and that sea levels are actually rising more slowly than models project.

For three days and three nights, the scientists continued to measure the river, as up to 430,000 gallons of water a minute poured off the ice and into the moulin. On the final morning, the team, tired but elated, gathered by the river as the boogie board made its final trip. By then, Mr. Ryan’s backup drone had safely completed its mapping mission. Mr. Overstreet broke open a celebratory bag of dried mangoes — a lavish treat for the ice campers.

“It’s hard to make the choice to come on projects like this, but everything in my life has prepared me to come out here,” Mr. Overstreet said. “We go from battling the river to working with it, and then we learn so much from it.” ☞

Exotic Foods in Arctic Cultures

"If it Moves, We Can Eat it!"

There are a number of guides to cuisines that are unique to certain cultures and parts of the world, and a description of a few of them relative to Arctic cultures are worth an explanation from personal experience. Descriptions of Arctic culture and cuisines differ considerably from the typical guides available on large cruise ships that are popular for visits to islands in the Caribbean Sea, for example. These cruises might advertise itineraries for retired people and other groups, stated in brochures as a cruise for the "Newly Wed, Overfed, and Nearly Dead," which tells the client what to expect.

Major differences also exist between foods and menus for each polar region, with "Antarctic cookbooks" derived from early to mid-20th century expeditions whose explorers and scientists were consuming whatever could be eaten from endemic wildlife, such as penguins and their eggs, seals and, in the case of the whaling industry, whale meat and introduced reindeer on South Georgia. Examples of foods and their preparation are found in books and articles, with a recent example in a book reviewed by Jeff Rubin in this issue of *The Polar Times*, his article on "Snotters," and the book *Hoosh*, by Jason Anthony. (See "Food Improvisations," below.)

Foods of Arctic cultures can be traced back thousands of years to people who lived and survived in Arctic regions where survival meant a successful hunt for caribou and musk oxen on land, and walrus, polar bears, seals, whales, and fish for coastal populations. The following paragraphs give examples of food options for cultures in selected Arctic and near-Arctic regions; many are the result of seasonal and weather changes that residents coped with to survive under harsh conditions that go back as far as hunting for mammoths. Fermentation, salting, and smoking, for example, became a necessity in order to provide food for long-term consumption, especially when refrigeration was not available. Food and survival in Antarctic regions in winter would be difficult be-

cause nearly all wildlife migrates north, as did humans, a major difference with food and survival in the Arctic, where many food sources are available year-round, or seasonally. Collection of food in summer and allowing it to ferment over time for later consumption is thus a major difference in food resources in northern and southern (Antarctic) hemispheres.

My background (born and raised in Minnesota) includes a reminder of the Scandinavian presence in the state at least once a year when the smell of lutefisk will open sinuses, but my experience with a comparable smell and taste is from numerous visits to Iceland, which I include here as an Arctic country because part of it is north of the Arctic Circle — not very much, as the photo shows.



GRIMSEY ISLAND, ICELAND — the only part of Iceland north of the Arctic Circle. Pictured: John Spletstoesser

Iceland Cuisine

The island of Grimsey, north of the mainland of Iceland, has the Arctic Circle at the sign post. The small island has a protected harbor with numerous fishing boats, a pop-



Hákarl — Icelandic for "fermented shark." It is a Greenland or basking shark which has been cured with a particular fermentation process and hung to dry for 4-5 months. Hákarl has a very particular ammonia-rich smell and taste, similar to very strong cheese.

ulation of 86 in 2011, and large numbers of nesting puffins and Arctic terns. Many of the fishing villages on the coast of Iceland indulge in a delicacy based on fish, known locally as "hákarl," or "kæstur hákarl," Icelandic for "fermented shark." The shark is Greenland shark or basking shark, and is poisonous when fresh because it lacks kidneys and as a result is constantly excreting urea throughout its body. The high concentration of uric acid and trimethylamine oxide, a natural antifreeze, makes it inedible. With that known, it would seem appropriate to throw it away, but Icelanders adopt the motto "If it Moves, We Can Eat it" (variation on Genesis 9:3 — "Every living thing that moves shall be food for you"), which indeed is the case when the shark is allowed to ferment for six to twelve weeks, depending on the season. It is often consumed as part of the midwinter festival. Two types of the delicacy can be produced — hákarl red, from the belly — and skyr (similar to "yogurt") from the body.

The next time you catch a Greenland shark, the following details will help you prepare it and add to your recipe files. After the shark is captured it is gutted and beheaded, placed in a shallow hole in gravelly sand, and on a slight incline, covered with sand and gravel, and stones placed on top of the shark in order to press the fluids from the flesh. Fermentation follows (at least six weeks), after which the shark is

removed from the hole, cut into strips and hung to dry for several months. A brown crust develops on the meat, which is cut away before eating. The meat is cut into

cubes and eaten on toothpicks. The strong ammonia smell produced can be alleviated in part by putting the diced meat into a shot glass of Brennivin (meaning “burnt wine”), an Icelandic type of akvavit or schnapps (locally called “black death”). After a few minutes the meat is “cleansed” by the schnapps and ready to eat, especially when washed down with Brennivin. (Hint: You will also find hákarl in the frozen food department

in Reykjavik and other city food markets.) *Bon appetit!*

You can also order hákarl at some restaurants in Reykjavik, but you also have other choices if you like adventurous cuisine. (Keep in mind, though, that Roald Amundsen, on his expedition to the South Pole in December 1911, said, “Adventure is just bad planning!” If you tried hákarl, you already knew that.) Restaurant searching in Reykjavik will often provide menu delights of shark meat (plain, not fermented), whale meat, and puffin and other seabirds native to Iceland. For something different, find Café Loki and have a look at the menu item *Svið*, the Icelandic word for boiled sheep’s head. (Note that although the letter looks like a “d” in the English alphabet, it is something else in Icelandic, and also does not pronounce as a “d.”) *Svið* is also known as “Satan’s Head on a Plate,” which provides a hint at what it looks like. The removed head is singed to burn off all hairs, boiled, de-brained, sliced in half, with the eyeball left in the head. The product

takes on the color brown, eaten with gus-to, along with the eyeball. The good news is that a bowl of soup is served with an order of *Svið*. Sheep leftovers are not wasted, so to



Big Diomed Island (Ratmanova), Russia, in foreground, and Little Diomed (U.S.) in distance with cloud cover between them. Numerous pods of walruses are in the water in the shallows of Big Diomed.

speak, as they are tied up in a sheep stomach and cooked, a delicacy called *slátur* (means “slaughter”). One form is called *blóðmör*, sheep’s blood pudding packed in suet and sewn up in the diaphragm or stomach.

If you want to try something else at Café Loki, hákarl is also on the menu, as are pickled ram’s testicles. Considering what choices await you in Iceland, you have to eat something, and it might be wise to carry a bottle of Brennivin with you. Also include something to combat halitosis.

Little Diomed, Alaska

Halfway around the world, another gourmet item found at select northern cultures is worth noting, although not palatable to most. Little Diomed is a U.S. island a short distance west of the Alaska mainland, with the International Date Line separating it from the nearby (2.4 miles away) Big Diomed, part of Russia (also called Ratmanova). See the photo, with Big Diomed in the fore-

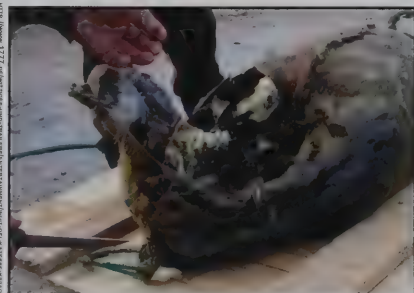
ground and Little Diomed in the distance at several different times revealed the difference between a small U.S. settlement and a military outpost at the easternmost point of Russia. Depending on who the commanding officer (CO) at Big Diomed was at the time of my first visit on a Russian icebreaker, he authorized our use of helicopters to land on top of the island, and only in an approved area. On another visit, with a different CO, no landing on the island, either by helicopter or a shore landing by Zodiac. Another time, helicopter flights around the perimeter, but no flying over the island (when the photo was taken). The reason for a no-fly zone was apparent when a crashed airplane was visible in the distance on the first visit.

Little Diomed (Inupiaq in the Inupiaq language), with a population of 115 in a 2010 census, has a comfortable little settlement with a modern school building and many houses. Access is by helicopter or by sea at a breakwater pier, or light aircraft on winter sea ice. The time to be there is when the thousands of seabirds (little auklets and murres) that nest on the rocky cliffs in back of the settlement are in the air heading to sea to feed or returning to nests. Young boys are waiting for them with slingshots, firing stone after stone into the dense flock of birds, with many hits and birds hitting the ground, providing a basis for another exotic food in an Arctic culture. The downed birds are taken to some of the houses in the settlement and put into buckets outside the doors. A glance at the contents of the buckets was



Sheep’s head (*Svið*) prepared for eating.

the key to an Arctic food called kiviak (or kiviaq), consisting of birds later stuffed into a sealskin bag to ferment for 3 months, producing gelatinous material eaten raw, bones, beaks and all. Kiviak is also common in settlements in northern Greenland, where I have seen it in Qaanaaq, north of the U.S. Air Force base at Thule. The significant aspect to this example of the hunt for birds is key to their fermentation and consumption in winter when the birds are not available.



Fermented birds sewn into a seal stomach.

If you already have most cookbooks in your collection for most any kind of food, consider the following:

"Little Diomed Inupiaq Glossary and Walrus Preparation Guide," Produced by the Kawerak Social Science Program, Nome, Alaska, 2014, 46 pages.

Sample contents of the Glossary and Walrus Preparation Guide include a 40-page glossary of the Language — and a guide to preparing walrus (p. 42-46), with detailed instructions on how to prepare various parts of the walrus — Liver, Breast, Chest, Heart, Kidney, Boiled Intestines, Clams from walrus stomach, and Baby walrus.

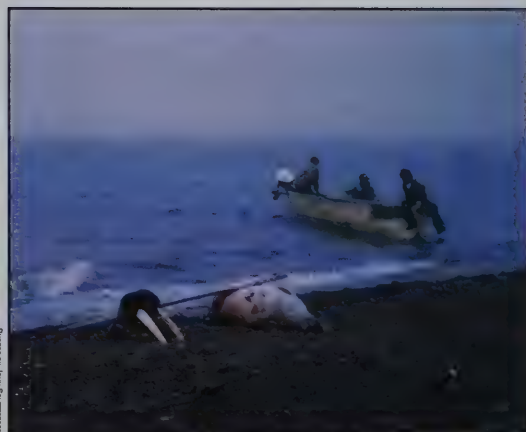
It is common in Arctic regions for caribou, fish and birds to be eaten raw, but polar bear meat is always cooked because bears carry the trichinosis parasite from eating carrion. Never eat polar bear liver because it is high in vitamins and toxic. It might have been Amundsen who said *"Never eat anything a dog won't eat."* I have tried "muktuk," the traditional Inuit/Eskimo and Chukchi meal of frozen whale-skin and blubber, often diced and eaten raw or deep-fried with soy sauce. The whale spe-

cies is normally bowhead, but can also be beluga or narwhal. I don't know what the species was in my experimental tasting of muktuk in a small village in Greenland, but it was memorable for the endless chewing it required before deciding to somehow swallow it or spit it out because it never became broken down to smaller bits. I also recall the oily taste.

Eating raw caribou, on the other hand, can be very tasty, as indicated by my experience in Greenland. A freshly-hunted animal was on a counter on a street in Nuuk, Greenland. The street resembled a butcher shop without walls, with various animals hanging on hooks. The man in charge, probably the hunter, cut off sample pieces of raw meat and handed them to passersby on the street, hoping to sell parts of the animal.

Diminishing Sea Ice: A Dilemma for Polar Bear and Walrus

Current estimates of polar bear and walrus populations suggest that diminishing cover of sea ice in the Arctic is a factor of climate warming, and may eventually result in a major decline in their numbers for survival. Comparisons of walrus taken in seasonal hunts show figures from Little Diomed and St. Lawrence Island in Bering Strait. A few years ago, 600 walrus were taken in



Walrus on beach at Barrow, Alaska, from a fresh kill by hunters. Walrus hide boat (umiak) is widely used in the Arctic by natives.

the spring hunt in St. Lawrence Island, in 2013 there were 340 for Gambell and Savoonga on St. Lawrence Island, and this year (2015) only 30. (Source: Suzanna Caldwell, *Alaska Dispatch News*, July 8, 2015.) By comparison, at Little Diomed, 140 miles north of Gambell, only one walrus was taken in the last three years, thought to be a factor of shifting sea ice and thinner ice. As the photo shows, ice is a necessity for walrus to haul out for rests following deep dives for feeding on clams and other food. If there is insufficient ice, they are forced to find land for a haul out (known as an *ugli*). One of the more ominous words for the Inuit hunter is *sikujuippog*, which means "There is no more sea ice."

(From the book *SIKU: Knowing Our Ice: Documenting Inuit Sea-Ice Knowledge*, Krupnik et al., eds., Springer, p. 420, 2010. See also p. 131 for walrus harvest data. Book reviewed in *Polar Record*, v. 48, Issue 4, October 2012.)

Food Improvisations

If walrus doesn't suit your taste buds, both polar regions have a variety of wildlife that can be found in recipes. *Hoosh*, a book by Jason Anthony, includes several ways to prepare penguin, for example, among other wildlife possibilities that comprise a "hot dish,"



Walrus "haul-out" (*ugli*) in Russia. Such dense packing of these animals becomes chaotic if they anticipate danger (for instance, a polar bear or a hunter) and stampede to the sea — unfortunately crushing the pups in the process.

“stew,” or whatever results from mixing pemmican, fat, seasonings, and whatever comes out of a back pack. Jeff Rubin provides details on how to prepare elephant seal for the hungry explorer (article on “Train Oil and Snotters: Eating Antarctic Wild Foods,” *Gastronomica: The Journal of Food and Culture*, 2013). See also Jeff Rubin’s review on page 26 of a recent book on the subject — “*The Antarctic Book of Cooking and Cleaning*,” by Carol Devine and Wendy Trusler. If scurvy and vitamin C are an issue for explorers, Robert Feeney’s book on “*Polar Journeys: The Role of Food and Nutrition in Early Exploration*,” 1997, is helpful. The author mentions the value of traveling on a rat-infested ship and becoming stranded for one reason or another. Most animals can manufacture vitamin C in their bodies, except for guinea pigs, humans, and other primates. Rats, in that case, are prized for their value in preventing scurvy, perhaps prepared best in a “hoosh.”

If you are lucky to have rats on the menu in critical times, mice have also been proven to be practical as a food source in the Arctic. In the movie “Never Cry Wolf” (1983, based on a book by Farley Mowat in 1963), a Canadian biologist on a field study in the Canadian Arctic to find the cause for a reduction in caribou populations, suspected to be from predation from wolves, discovered that wolves did fine in winter by eating the hordes of mice that occupied the area. The biologist thought that if wolves survived from a diet of mice, so would he ... and he did, eating mice in any manner that his imagination took him — “mouse sandwich” looked especially good, with the bones cracking as he munched away.

There are, of course, other options to the foods of Arctic cultures discussed above, especially if you are fortunate to find your way to northern Scandinavia, where my favorite can be found — Arctic char over a campfire in northern Finland. ¶ Jason Anthony and Jeff Rubin provided many helpful comments in the final version of this manuscript, and an appropriate book helped with details on preparation of several food items discussed herein. For example, see my review of *The Nordic Cook Book* in this issue of *The Polar Times*, p. 26.

Shackleton's Icebound Survival Story, Up Close

London exhibition will eventually tour U.S.

The Wall Street Journal, 20 November 2015, by J.S. Marcus—In the photography world’s equivalent of an IMAX event, devotees are about to get a hyper-detailed view of one of exploration’s great survival stories.

Beginning in 1914, the British explorer Ernest Shackleton took the sailing vessel *Endurance* to the Antarctic as part of an ambitious expedition meant to traverse the continent. The ship became icebound, finally sinking on Nov. 21, 1915, and stranding the ship’s 28 men.

While most of the crew, including the expedition’s official photographer, Frank Hurley, waited on uninhabited Elephant Island off the Antarctic coast, Shackleton and a few of his men made an 800-mile sea voyage in a lifeboat, eventually reaching the South Atlantic’s South Georgia Island. They climbed glacier-topped mountains to reach a whaling station, where Shackleton arranged a rescue of the rest of his crew. The *Endurance*’s entire crew survived, and Hurley’s photos are a haunting visual account of the ordeal.

Beginning today, London’s Royal Geographical Society, the main repository of Frank Hurley’s glass-plate and Kodak negatives of the journey, will honor the centenary of the *Endurance*’s sinking with the debut of digital versions of the photos, along with several objects that survived the voyage. “The Enduring Eye: The Antarctic Legacy of Sir Ernest Shackleton and Frank Hurley” ends Feb. 28 and will later tour to other U.K. sites, the U.S. and Canada. The itinerary hasn’t been announced.

The London version of the show includes 97 Hurley photographs along with objects such as a Union Jack presented to Shackleton by King George V and meant to be flown at the South Pole. The flag made its way back with the rescued crew.

Hurley’s images themselves may be familiar, says Alasdair Macleod, head of collections at the Royal Geographical Society, but the clarity of the new prints made by digitally scanning the original negatives means the photographs will have “greater resolution than ever before.” The file sizes of previous digital versions

were about 4 megabytes each, while the newly scanned versions are about 1.5 gigabytes.

The exhibit has developed the new digital scans into over-size prints, some more



The *Endurance*, moored in ice. Photo by Frank Hurley.

than 8 feet long. “Hurley always intended his images to be several feet across,” says Mr. Macleod.

In addition to revealing previously unseen details of the images—like the names of the books the crew was reading—the new digital versions will be able to show “how the ice looked” at the time, he adds. That could help climate scientists track changes to the continent’s ice cover.

The show opens at a time of strong sales for Shackleton memorabilia. Last month, a travel, science and natural history auction at Christie’s London sold 15 medals presented to Shackleton for a total of about \$883,000, far above the presale high estimate of \$164,000. ¶

Coast Guard to Finalize Icebreaker Acquisition Strategy By Spring; Production By 2020

USNI News, 9 December 2015, by Megan Eckstein—The Coast Guard intends to develop an acquisition strategy for its heavy endurance icebreaker program by the spring and reach production-related activities by 2020, after President Barack Obama announced in September that the United States should accelerate the icebreaker program to support increased activity in the Arctic.

Coast Guard acquisition chief Rear Adm. Mike Haycock said at an American Society of Naval Engineers chapter meeting that his office would begin “aggressive industry outreach” in January to help inform both the acquisition strategy and the physical requirements for the ship.

“Nothing is set in stone,” Haycock said.

“We’ve worked through the requirements piece of it, so we have our operational requirements document, which is getting close to being done.”

Haycock said the operational requirements document should be signed by Coast Guard leadership and then Department of Homeland Security leadership by January. That document will inform functional requirements and eventually the ship design, but until the Coast Guard talks to industry in the coming months, nothing is off the table for design or acquisition strategy.

“This industry engagement piece is too important for us to go prematurely knocking down solutions,” he said.

“It’s a pretty heavy price tag, we’re looking at probably no less than \$1 billion to build one of these things. We’re hoping that if we build at least two there’s enough interest from industry that this is worth their effort.”

The Coast Guard is in the midst of an analysis of alternatives and an affordability assessment. After those documents are completed and signed, and the Coast Guard acquisition community holds in-

dustry day events and one-on-one meetings with potential contractors, “our goal ultimately is to come up with a strategy that’s going to enable us to start production, production-related activities, by 2020, which is very aggressive.”

A country that has a large interest in presence and a national security mission up in the Arctic would have a fleet that’s proportional to their interest.

— Rear Adm. Mike Haycock

That aggressive schedule will be important if operations in the Arctic continue to increase as expected. Today, the Coast Guard has just one heavy endurance icebreaker and one medium endurance icebreaker to call upon: Coast Guard Cutters USCGC *Polar Star* (WAGB-10) and USCGC *Healy* (WAGB-20). A second heavy icebreaker, *Polar Sea* (WAGB-11), was placed in inactive status in 2011 and has been somewhat cannibalized to help supply *Polar Star*, since the ships are more than 35 years old and not all spare parts are still available.



U.S. Coast Guard Cutter *Polar Star* (WAGB-10). US Coast Guard photo

“With one icebreaker down ... we have one cutter that’s getting double duty,” Haycock said.

“It’s going to Antarctica every year. And so it used to be that you would go to Ant-

arctica, do a dry dock availability, do a couple Arctic missions, do a dockside availability, and then you start the whole cycle over again every two years.”

That high operational tempo is taking its toll on *Polar Star*, he said. Dry dock periods are lasting longer than they ever have in the ship’s history, Haycock said, and “it can’t be sustained.” The ship was refitted in 2006 to extend its service life until 2020 to 2023, but Haycock said the ship needs help managing the icebreaking workload as soon as possible.

“There’s no backup, we have no redundancy,” he said.

Ultimately, the Coast Guard believes it needs five or six icebreakers, compared to today’s two: three medium and two or three heavy icebreakers. But Haycock warned that the Coast Guard wouldn’t be able to get to the medium endurance icebreakers for some time, despite the need.

The Coast Guard receives about \$1 billion to \$1.2 billion a year for recapitalization, “and the recapitalization need in the Coast Guard is far greater than that. We have aircraft that need to be recapitalized as well, and we’ve had to put that off. So

that’s next in the hopper, in the 2020s timeframe we’re going to have to recapitalize ... our aviation fleet. We have other cutters that are in dire need of recapitalization as well. Our inland fleet needs attention drastically as well. We know we need a medium duty icebreaker, and we know the importance of that fleet in the Great Lakes, but we can’t have it competing with the stuff we’re doing right this second.

“To be honest with you, the icebreakers – we can’t afford to recapitalize an icebreaker within our budget as it is,” he continued.

“Our acquisition budget is completely spoken for – our offshore patrol cutter

(CONTINUED AT RIGHT)

Obama Aims to Add Arctic Icebreakers

The New York Times, 2 September 2015, by Julie Hirschfeld Davis, SEWARD, Alaska—President Barack Obama proposed on Tuesday accelerating the acquisition and building of Coast Guard icebreakers that can operate year-round in the nation's polar regions. It's part of an effort to close the gap between the U.S. and other nations, especially Russia, in a global competition to gain a foothold in the changing Arctic.

The president's proposal, which came on the second day of a three-day trip to Alaska to highlight the consequences of climate change and call for a worldwide effort to address the issue, touches on one of its most profound effects. The retreat of Arctic sea ice has created opportunities for shipping, tourism, mineral exploration and fishing, but the rush of marine traffic that has followed is bringing new difficulties.

The aging Coast Guard fleet is not keeping pace with the challenge, the administration acknowledged. It noted that the service has the equivalent of just two "fully functional" heavy icebreakers at its disposal, down from seven during World War II. Russia, by contrast, has 41 of the vessels and plans 11 more. China unveiled a refurbished icebreaker in 2012 and is building another.

Obama, who announced his proposal in Seward, where he hiked to Exit Glacier and toured Kenai Fjords National Park by boat, is trying to accelerate the acquisition of a replacement icebreaker by two years, setting a new date of 2020. He also proposed that planning begin for the construction of others; he asked that Congress provide "sufficient resources" to fund them.

The highways of the Arctic are paved by icebreakers. Right now, the Russians have superhighways, and we have dirt roads with potholes.

— Senator Dan Sullivan

The move fell short of guaranteeing the new icebreakers. Lawmakers must approve the funding, and it would take years for the vessels to become available. But Alaska's senators, Lisa Murkowski and Dan Sullivan, both Republicans, cheered the step, saying it was long overdue.

"The highways of the Arctic are paved by icebreakers," Sullivan said. "Right now, the Russians have superhighways, and we have dirt roads with potholes."

From a distance, Exit Glacier appears as a river of white and blue flowing down through the mountains toward lower terrain. In fact, it's just the

opposite. The 2-mile-long chock of solid ice has been retreating at a faster and faster pace in recent years — more than 800 feet since 2008, satellite tracking shows.

"This is as good of a signpost of what we're dealing with when it comes to climate change as just about anything," Obama said with the iconic glacier at his back.

Obama trekked up to the glacier, which is in the national park, with photographers in tow in a carefully choreographed excursion aimed at calling attention to the ways human activity is degrading cherished natural wonders.

"We want to make sure that our grandkids can see this," Obama said, describing the glacier as "spectacular."

Also on Tuesday, Obama announced an initiative by the National Oceanic and Atmospheric Administration and the Coast Guard to map and chart the newly accessible Bering, Chukchi and Beaufort seas.

The oceanic agency also will install new equipment in the Arctic in the "near future" to monitor climate-change effects and enhance marine safety, including stations to monitor sea-level rise and satellite measuring of sea-ice thickness, the White House said.

Information from the Associated Press was included in this story. ¶

is our top number-one priority from the commandant. When you start putting all the other programs that we've got going on with that, the billion, billion-two isn't enough to do what we need."

To help reduce cost, the Coast Guard signed agreements with Canada and Finland to leverage research they've already done into icebreaker design and capabilities. However, the United States has missions in both the Arctic and Antarctic, making its requirements somewhat unique. The ships will have to traverse open ocean for about

10,000 miles each way to reach the Antarctic for missions such as resupplying the McMurdo Station research center. And the environment in the Antarctic is harsher than in the Arctic, which will require greater capability from the ship.

Despite the challenges, Haycock said the U.S. needs to get this program going if it is to have a presence in the increasingly busy Arctic waterways. The Coast Guard's annual "Major Icebreakers of the World" chart lists the U.S. as having five ships — the two operational icebreakers, plus the

laid-up *Polar Sea* and two privately-owned ships with icebreaking capabilities. Russia, on the other hand, is listed as having 41, with five more under construction now and six more planned.

"A country that has a large interest in presence and a national security mission up in the Arctic would have a fleet that's proportional to their interest," Haycock said.

"You can see that's true in Russia's case; it is not so evident in our case." ¶

A Dinosaur Species That Lived Above the Arctic Circle

A 69-million-year-old find is evidence of a warmer Alaska



A handful of juvenile neckbones of *U. kuukpikensis*, which were found in northern Alaska.

The New York Times, 28 September 2015, by Nicholas Bakalar—Researchers have found a new species of dinosaur that lived 69 million years ago above the Arctic Circle, the farthest north dinosaurs have ever been found.

The animal, a plant eater about 30 feet long, has been named *Ugrunaaluk kuukpikensis* — ancient grazer of the Colville River, in the Inupiaq language of the Inuit natives of Alaska.

“It had crests along its back like Godzilla,” said one of its discoverers, Gregory M. Erickson, a professor of biological sciences at Florida State University. The dinosaur’s jaw was lined with at least 1,000 teeth with coarse surfaces perfect for pulverizing plants.

U. kuukpikensis belongs to the hadrosaur group of duck-billed dinosaurs. It was 25 to 30 feet long, six or seven feet high at the hip, and probably covered with scales. While its front legs were much shorter than its back legs, it could walk on all fours.

The paleontologists who work the site have, to put it mildly, a difficult commute. It begins with a 500-mile drive north from the University of Alaska Fairbanks along the oil pipeline to Prudhoe Bay.

The paleontologists who work the site have, to put it mildly, a difficult commute. It begins with a 500-mile drive north from the University of Alaska Fairbanks along the oil pipeline to Prudhoe Bay.

“From there we fly a few hundred miles to the river in a plane with balloon tires that can land on gravel bars,” Dr. Erickson said. “Then we use inflatable boats to get around. It takes seven or eight flights to get all the equipment in.”

The climate when *U. kuukpikensis* flourished was much warmer than today,

with average temperatures in the low 40s.

“These animals were living in a very strange world,” said another member of the team, Patrick Druckenmiller, earth sciences curator at the University of Alaska Museum of the North in Fairbanks. “They probably had freezing and snow in the winter, and they had to survive four months of complete darkness. Finding food would be difficult. The plants are not growing at this time, and they would have to live on low-quality forage: ferns, twigs and bark.”

The find was described in the journal *Acta Palaeontologica Polonica*.

“The neatest thing is that our work is showing that there were dinosaurs thriving above the Arctic Circle, and all the ones we’re finding are unique to Alaska,” Dr. Druckenmiller said. “These are not the same species as at lower latitudes. What we have is a unique community of dinosaurs that lived in the polar regions when the world was a very different place.”

Enormous Mounds of Methane Found Under the Arctic Sea

Underwater pingos may reveal ‘worrying’ clues about climate change

Daily Mail, 16 December 2015, by Richard Gray—Huge mounds filled with methane have been discovered forming on the frozen sea bed of the Arctic Ocean, raising fears they are being caused by climate change.

Scientists fear thawing permafrost be-

neath the ocean is causing methane to become free, forming underwater pingos — mounds of earth and ice — off the coast of the Yamal Peninsula in Siberia.

Similar structures are thought to be behind enormous craters that have appeared on the land on the peninsula as methane

exploded out of the Earth.

Read more: <http://www.dailymail.co.uk/sciencetech/article-3325230/Enormous-mounds-methane-Arctic-sea-Underwater-pingos-reveal-clues-climate-change.html#ixzz3uWhzJfSK>. ¶

Latest study

Woolly Mammoths Likely Died Out on Remote Island

REUTERS WASHINGTON, by Will Dunham—The most complete genetic information assembled on woolly mammoths is providing insight into their demise, revealing they suffered two population crashes before a final, severely inbred group succumbed on an Arctic Ocean island.

Scientists yesterday unveiled the first two full genomes of the elephant relatives emblematic of the ice age, showing they experienced an extensive loss of genetic diversity before perishing roughly 4,000 years ago.

Well-preserved DNA came from two mammoths: a 45,000-year-old calf carcass from Siberia; and a 4,300-year-old molar from a mammoth in the last population

isolated on remote Wrangel Island, off the Russian mainland. Inbreeding was detected in the Wrangel Island mammoth.

“The individual from Wrangel Island, which was one of the last surviving woolly mammoths in the world, had a much lower genetic variation compared to the other, more-ancient individual,” said Love Dalen, geneticist at the Swedish Museum of Natural History.

The woolly mammoth, about the size of today’s elephants but with long brown fur and colossal tusks, first appeared 700,000 years ago in Siberia, expanding through northern Eurasia and North America. Whether their extinction resulted from a warming climate or human hunting remains hotly debated.

Harvard Medical School geneticist Eleftheria Palkopoulou said the genomes indicated two major population crashes: one around 280,000 years ago from which the population recovered, and a second about 12,000 years ago, near the ice age’s end, from which it did not.

After the second one, an estimated 300 to 1,000 mammoths survived. A small Wrangel Island population existed for about 6,000 years after all mainland mammoths had died. The inbreeding probably harmed the population’s viability, Dalen said.

The research appears in *Current Biology*. ¶



A painting of the northern or woolly mammoth which inhabited North America during the Ice Age



Photo by Captain Patrick R. M. Toomey,
Canadian Coast Guard (retired)

A Cub Named “Lucky”

by Ben J. Cagle, Lifetime Member, APS

The polar bear cub was a bundle of energy. A villager had brought it in, and we assumed that was because the laboratory had a large female bear in a cage. A scientist from the outside came occasionally to check on the bear's health and behavior.

Our curiosity about the bear was increased when we realized that a bear seldom gets by the village of Barrow, Alaska. A native thought only of a fur coat when he saw a polar bear, and his first act to accomplish that need was to dispatch the bear with his hunting rifle. If there was a cub with the mother bear, he gave it to the sled dogs for their consumption.

But what could we do with this cub? It was out of the question to consider raising it, because it was still a nursing cub. We couldn't just take it out and leave it on the ice-covered ocean, because it would have no way to survive.

As we considered this dilemma, someone suggested an experiment. Why not find a mother for the cub? One in our group was the polar bear census taker. He flew every day out over the ice-covered ocean to find and count the population

of polar bears. His helicopter pilot took him out each morning looking for bears. When they saw one, they flew low so the counter could estimate its size. He then loaded a dart with the right amount of tranquilizer in his shotgun, and the pilot brought the aircraft dose enough for him to fire the dart into the rump of the bear.

As the bear slowed down, it collapsed on its hind legs first. And by the time they had landed on the ice, the bear was almost asleep with only its head weaving slowly and its jaws clamping in a last desperate attempt to remain awake.

They proceeded to tag an ear or look for an old tag from a previous year. Then they made some measurements and took a blood sample. When finished, they painted a large black circle on the bear so that if they saw it in the future, they would not count it again. The black came off as the bear grew new fur in its winter den.

The census taker, whom we called the government man, had tagged a mother bear with a cub the day before and thought he could find it again. So the experiment was discussed, and the census taker agreed to take our cub with him the next day —

which he did. He found the mother bear with her cub and proceeded to tranquilize her again with his dart.

They landed and approached the bear and cub. There remained the problem of getting the mother bear to adopt our cub. So they decided to alter and blend the odor of both cubs. This they did with material available. A mother bear usually defecates when struck by the dart, and she had deposited a goodly supply. So they proceeded to smear it liberally on both cubs. When finished, they retreated, because the mother bear was beginning to wake up and both men now smelled like the material they had smeared on the cubs.

The next day and for several days thereafter they flew out over the route and observed that the mother bear continued to have two cubs. This completed our experiment. We concluded that the mother bear had adopted our orphaned cub. Perhaps the alteration of its odor was effective, but mothers usually have more than one way to identify their own. Perhaps it was a mother's instinct to adopt a cub in need. ¶

Study Shows Polar Bears Don't Enter Hibernation

The New York Times, 17 July 2015, by James Gorman—Scientists have long considered the possibility that polar bears enter a kind of walking hibernation to cut down their energy demands during the summer, when food on land is scarce.

Some research supported this idea, and a web search will find it stated as fact on some sites. But a new multiyear study that monitored the temperatures of bears living on ice and on land found no evidence of the sharp drops in body temperature that signal a decrease in the need for food in the summer.

"We didn't find anything that looks like hibernation," said John P. Whiteman, a biologist at the University of Wyoming, who did most of the research.

Andrew Derocher, a bear biologist at the University of Alberta and a scientific adviser to Polar Bears International, an organization devoted to polar bear conservation, said the findings added to concerns about polar bears' futures because food sources on land are more scarce compared with the seals the bears eat when they are on the ice.

A hibernation state would be a potential physiological defense to help them cope with the reduced food sources on land during summers that are becoming longer because of climate change.

A report on the research was published Thursday in the journal *Science* by Dr. Whiteman, along with Henry J. Harlow

and Merav Ben-David, who are also biologists at Wyoming, and other researchers with the United States Geological Survey, the United States Fish and Wildlife Service, both in Anchorage, and Polar Bears International. Dr. Derocher was among the scientists who were asked by the journal to review the paper before its publication.

Dr. Whiteman said that the most important aspect of the study was that it gathered a range of information on bear physiology during the bears' summers on land and on ice over several years.

"This data did not exist at all," he said, because it was so hard to obtain. The researchers used helicopters and a United States Coast Guard icebreaker to find and dart the bears with tranquilizers. The study was done in the Beaufort Sea, north of Alaska and Canada, and on its coast.

The researchers set up wind screens and lights, Dr. Whiteman said, "trying to recreate an animal surgical suite in the field." They inserted devices into the abdomens of 10 bears to record body temperature. They also used collars to track location and activity levels, and inserted temperature recorders into the rumps of some bears.

About two dozen bears were studied in all, with the overall goal of getting a better picture of the physiology of polar bears in the summer. The researchers also took body measurements and fur and blood samples.

"We've got years and years of working with this data ahead of us," he said.

Walking hibernation is only one issue addressed in the research, and Dr. Derocher said that the study refined the understanding of what bears go through. He said he still thought the term was useful because hibernation refers to a spectrum of changes that occur in different animals.

He noted that the new study showed that the polar bears do not reduce their body temperatures or energy needs in the way that other species of bears did while hibernating in dens.

But, he said, past research shows that polar bears undergo some physiological changes in the summer in the way they reincorporate some chemicals into their bodies that would normally be excreted as waste. That helps them avoid some of the damages that a human would suffer with the kind of fasting and weight loss many bears undergo in the summer. Dr. Whiteman's study did not address those physiological studies.

He also found that the bears cooled a part of their body core while swimming in icy water, which was a surprise. It may have to do with keeping deeper, more essential parts of the core warm, he said, but more information is needed for a full understanding of the phenomenon. ¶

Inside Polar Bear Hair: A Complex, Heat-Holding Labyrinth of Pores

Alaska Dispatch News, 11 August 2015, by Yereth Rosen—Polar bear hairs are hollow to maximize insulating qualities of the animals' fur, as almost every student of the Arctic knows.

But now a set of studies from China shows polar bear hairs are much more than simple tiny tubes.

Detailed mathematical analysis of the hairs, published in the journal *Thermal Science*, finds they have complex structures that make them much better insulators than simple hollow hairs would be.

Microscopic examination of polar bear hairs reveals their interior is a structure of membrane pores, researchers from several Chinese universities have found. The latest analysis finds the pore structure is arranged as a fractal, a series of repeating patterns spun off into smaller dimensions.

Calculation of the pore structure finds the ratio of its dimensions to be close to a mathematical figure known as the "golden mean," the ideal dimension ratio for an

infinitely spiraling fractal, says one study. The dimension ratio of the inner structure of the analyzed polar-bear hair was calculated at 1.625, close to the golden mean, which is also called Phi and is approximately 1.618; the golden mean "must reveal the possible optimal structure of polar bear hairs," the study says.

Though it appears white, polar bear fur is translucent, helping it absorb environmental heat, the study points out. Without the interior pores' fractal arrangement, however, the translucent hair that absorbs light could easily send heat back out into the environment, the study says.

A related study, with some of the same co-authors, calculates the equation for one-dimensional heat conduction through each "labyrinth cavity" of the hair. The authors used calculus to arrive at a differential equation showing how heat moves through the hairs.

The studies — the latest in a series on the same subject by the same group of Chinese researchers — are not mere academic exercises.

Understanding the structure and workings of polar-bear hairs "may find many potential applications in the future, especially in thermal insulation designs for extreme cases," said an earlier study by some of the same authors, published in 2011 in *Thermal Science*.

They note in their studies that polar bears maintain body temperatures of 98.6 degrees in an environment where temperatures can dip as low as minus 76 degrees.

The Chinese researchers are not alone in looking to polar-bear hair as a model for future heat-collecting and heat-holding products.

Some German scientists are exploring the possibility of using flexible, lightweight materials — in structures arranged somewhat like polar-bear hairs — to collect solar heat. Current solar energy systems use rigid collectors and mirrors, but new systems could be "inspired by the transparent insulation and heat harvesting strategies of polar bear fur," the researchers report in a new study published online in the journal *Energy and Buildings*. ¶

Paris Accord: Step One Done

Scientists Rail Climate Pact as Key Step in Fight Against Warming

Climatologists remain wary about how effective pledged emissions cuts will be

The Wall Street Journal, 13 December 2015, by **Gautam Naik**—Scientists hailed the Paris agreement on climate change as an important step forward to reducing the most severe impacts of a warming earth—welcoming mechanisms intended to keep nations ambitious about reducing carbon emissions but wary about how vigilant they will end up being.

“Climate change will continue, but now at a much reduced pace this century relative to what it would be without an international agreement and adherence to it,” said Jeffrey Kargel, a researcher at the Department of Hydrology and Water Resources at the University of Arizona.

The agreement, signed by more than 190 countries, aims to keep the warming well below 2 degrees Celsius above preindustrial levels, and stakes out the more ambitious goal of keeping warming to 1.5 degrees below those levels.

However, climatologists argue that the pledged emission cuts by nations aren't by themselves sufficient to achieve those goals. The warming is already approaching one degree and is predicted to reach 1.2 degrees in 15 years. That makes the hope of restricting

overall warming below 1.5 degrees especially challenging.

Warming has been blamed for a range of undesirable outcomes, from the rapid melting of summer ice in the Arctic to a rise in sea levels and an increased frequency of extreme weather events. Policy makers and scientists argue that a dramatic shift away from fossil fuels and toward renewable energy is the best way to keep a lid on temperatures and forestall the most serious aspects of global warming.

Based on the pledges for emission cuts as outlined in the Paris agreement, the earth could still warm by anywhere from 2.7 degrees to 3 degrees above preindustrial levels in the next century, according to one set of calculations. To avert that, scientists say that countries will need to dramatically boost their emission reductions in future years.

But there is a mechanism in the Paris accord to help achieve that, a key reason the agreement has been hailed as a success, despite the fact it doesn't legally bind any nation to specific greenhouse-gas emissions cuts. As part of the agreement, the countries have agreed to ratchet up their level of emission reductions every five years, starting in

2018.

“If they increase their emission cuts after 2025, we'll see more reductions in temperature” than the predicted 2.7-to-3 degree increase, said Simon Lewis, an environmental scientist at University College London. “We'll see in coming years if that occurs.”

The danger is that countries' pledges to reduce greenhouse-gas emissions may yet falter. Some legislatures could fail to ratify the pact. Or, when governments change, might undo the pledges made by their predecessors.

“Meeting [the Paris] target will require fossil fuels to be kept in the ground, unexploited and stranded as assets—yet nothing is said on how this will be achieved,” said Nick Hewitt, a professor of atmospheric chemistry at Lancaster University in the U.K. “And with almost one degree of warming already ensured, there are very considerable grounds for skepticism about this ‘historic’ agreement.”

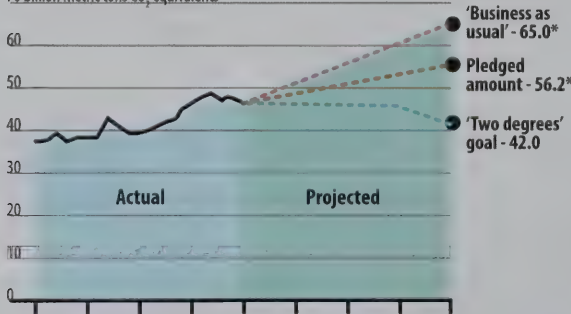
Richard Allan, a professor of climate science at the University of Reading in the U.K., added: “Paris has delivered a plan, next begins the hard bit: action.” ¶

Promising Start

Pledges made at the summit may not be enough to limit global warming to less than 2 degrees Celsius above pre-industrial levels but could spur a significant cut in emissions compared with existing policies.

Greenhouse-gas emissions

70 billion metric tons CO₂ equivalents



*Assumes no new national energy policies from 2010 onward

**Based on unconditional INDCs of 102 countries.

Source: Michel den Elzen, PBL Netherlands Environmental Assessment Agency

Key points of the agreement

- Aims to bring growth of greenhouse gases in the atmosphere to zero by the second half of this century.
- Requires for first time that all countries curb emissions, not just developed ones.
- Targets no more than 2°C (3.6°F) rise in temperature, but aspires to go further.
- Richer countries take lead in mobilizing more than \$100 billion annually to help developing countries meet agreement.
- Establishes a process to review, assess, and update emissions-reduction plans.

More To Come

Editorial by Cliff Bekkedahl, Managing Editor

What follows is a short editorial that appeared in November in my hometown newspaper, *The East Hampton Star*. We are on the south fork of Eastern Long Island, a wealthy community with hundreds of summer homes owned by well-to-do New Yorkers (real money!), a host of vacationing celebrities of stage and screen, and one of the top ten beaches in the U.S.

Beach erosion has become a real issue — divisive and, alas, generational and political. What must we do to save our dunes and beaches? Nobody knows, but everyone thinks they do.

Certainly, this is not your immediate problem. I reprint this editorial simply to make our readers aware that the certainty of climate change and such phenomenon as the inevitable melting of the Greenland ice sheet and consequent rise in sea levels is starting to capture the attention of coastal residents from Maine

to Florida and their counterparts along our Pacific shores.

Think about it: So many small but influential communities, desperate to protect their way of life but divided as to methods to ameliorate their undeserved assault by Mother Nature, anxious for Federal Government monies or guaranties but leery of the heavy hand that conveys free stuff ... I think you get the picture!

We're going to see an endless number of editorials and television talk shows on this subject, just like the following. Indeed, I suggest the editorial with some minor updates could become the template for thousands like this one, which are sure to appear in every small-bore community newspaper on both our coasts.

The final paragraph says it all, and my guess is, it will be said for decades to come. ¶

Dire Implications in Greenland Ice

Recent news about the Greenland ice sheet is an alarming warning

The East Hampton Star, 19 November 2015 (Editorial)—As attention continues to be focused on the Army Corps project on the Montauk beach, it is vital that the far more encompassing problem of sea level rise gets attention.

Recent news about the Greenland ice sheet is an alarming warning. According to recent data, glaciers in its cold and dry north long thought to be stable are changing, and the shift could have dire implications for the world's coastal communities — like East Hampton. Just two of these glaciers hold enough frozen water to raise global sea levels by three and a half feet.

If 3.5 feet does not sound like much to you, consider that researchers believe that the natural landward shift of shoreline is at least 1 to 10 feet. That might mean for eastern Long Island that a single foot of sea level rise would push the dunes and estuary edges back about 10 feet or, if those Greenland

glaciers were to entirely break loose, roughly 35 feet of potential shoreline loss. And some coastal geologists have put the recession figure for sand beaches at a frightening 150 times the rate of sea level rise. This is a massive crisis for the East End, but almost no authority is showing any sign of adequate response.

The 14,500-sandbag seawall that the East Hampton Town Board recently vowed to see through to completion will cover only a tiny portion of East Hampton's roughly 70 miles of shoreline. In the long term, as erosion is only predicted to accelerate, a gradual, managed retreat from the coast will be the only option.

Earlier this year the town board appointed a committee to map out a path to coastal resiliency, using a \$250,000 state grant. The members are a mix of town staffers, elected officials, and representative of public and private agencies. It is a start, but to be really successful, the Coastal Assess-

ment Resiliency Plan committee will have to accomplish at least two things: hire top-flight experts to guide the process and then convince local, state, and county regulators to follow their recommendations to the letter.

Although nine years of work went into the town's Local Waterfront Revitalization Plan, it was essentially tossed in the waste bin when it came to the Montauk Army Corps project. This should give the opponents of the Corps project a very real reason to doubt that the town's new resiliency committee's effort will amount to much. The critics would be happy to be proven wrong, of course, but considering that the powers-that-be are the same people responsible for the looming Montauk disaster, it will take a great deal to convince them that anyone is on the right course.

What is happening now in Greenland should be a wake-up call both locally and for leaders in Washington. Is anyone listening? ¶

What's New on the APS Web Site?

by John Splettstoesser

Note: Links mentioned in the following article are available from the APS web site at www.americanpolar.org.

Bob Headland and Ship Travel

The APS web site is gradually enlarging as a result of the contributions from Robert K. Headland at the Scott Polar Research Institute (SPRI), University of Cambridge, England. The list of Northwest Passage Transits has been updated to include the 2015 passages, and a new list is included for ships that have reached the North Pole as of 2015. Bob has also updated several lists we posted earlier on the website, including signatories of the Antarctic Treaty.

Another country joined in October 2015. If you guessed "Iceland," you would be correct. Why Iceland? *Pourquoi pas?* The addition of Iceland as an acceding (non-voting) member makes a total of 53 signatories of the Treaty, with 29 consultative (voting) and 14 acceding.

Visit our site (web address above) to see updates of these articles. Under "Quick Links" (at the bottom of the home page), click on "Polar Compendium."

Bob Headland's affiliation with the NW Passage transits as historian and lecturer began in 1992 aboard *Kapitan Khlebnikov* when he and I were lecturers on an itinerary starting in Cape Town and visiting island groups in the Indian Ocean and Australian stations in Antarctica. The itinerary was the first for the ship, a Russian icebreaker carrying tourists in Antarctica.

Bob's NW Passage transits to date total twelve, more than any other person except perhaps for captain or crew of several Russian vessels and, perhaps, Canadian icebreakers. A complete transit requires passage from the Atlantic Ocean to the Pacific or vice versa, ruling out numerous other vessels in the NW Passage without a complete transit.

Bob's North Pole cruises on nuclear-powered icebreakers began in 1991 aboard *Sovetskiy Soyuz* and total more than 50 visits to the North Pole to date. It is obvious that he has an attraction for Russian icebreakers, including many kilometers on them in Antarctica. He is bipolar (South Pole in 1995), and other polar affiliations include British Antarctic Survey (BAS) from 1977 and SPRI since 1983 (now honorary Research Associate specializing in history and geography). His assignment with BAS included South Georgia when, in 1982, he was taken prisoner with the BAS scientific staff and a small detachment of British marines by Argentine naval forces who invaded the island on April 3, to be released later in Uruguay. His residence in Cambridge, England, is on Mawson Road, implying a third "pole." [Sir Douglas

Mawson reached the vicinity of the South Magnetic Pole in 1908 as a member of Shackleton's 1907-1909 expedition.]

Association of Arctic Expedition Cruise Operators (AECO)

Learn all about the the Association of Arctic Expedition Cruise Operators (AECO) by accessing their link (www.aeco.no) from the American Polar Society website at the bottom of the Home Page under "Polar Resources." An introduction to this relatively recent organization, begun in 2003, can be summarized as "representing concerns and views of Arctic Expedition Cruise Operators dedicated to managing responsible environmentally friendly and safe tourism in the Arctic to set the highest possible operating standards." Members of AECO are obliged to operate in accordance with a number of different guidelines, developed to ensure these objectives.

Comparable in many ways to its counterpart in the Antarctic — the International Association of Antarctica Tour Operators (IAATO) — AECO's area of coverage is north of 60°N latitude and includes Svalbard, Jan Mayen Island, Greenland, Arctic Canada, and the national park "Russian Arctic."

Frigg Jorgensen is executive director of AECO, and Ilja Leo Lang is office manager in Denmark. AECO's offices are in Longyearbyen, Svalbard, and Copenhagen.

AECO's Annual Report for 2014–2015 lists 48 members, 26 of whom operate 32 expedition cruise vessels all over the Arctic. Some members are also members of IAATO, operating in both polar regions.

When visiting the AECO site, be sure to click on the link to their animated tourism video at <https://player.vimeo.com/video/114129102?byline=0&portrait=0&autoplay=1>.

International Association of Antarctica Tour Operators (IAATO)

A link to IAATO (www.iaato.org) is listed under the heading "Polar Resources" on the home page of the American Polar Society website.

IAATO was founded in 1991 and will celebrate its 25th anniversary in 2016, having grown from an initial seven charter members of tour operators active in Antarctica to more than 100 members presently (2016) who consist of active tour operators, travel agents, government offices, port and ship agents, and others from across the globe. IAATO operates with similar guidelines to AECO, with protection of the environment in mind, and interacts closely with Antarctic Treaty Parties in annual Consultative Meetings in which issues are discussed and activity reports are presented to the Treaty parties in special sessions on tourism. IAATO and AECO were introduced in previous issues of *The Polar Times* under the headings of "Polar Treaties" (July 2014 and January 2015). Look for review articles on both organizations in future issues.

University of Maine Virtual Polar Resource Center

A new center for polar resources was established in 2015 at the University of Maine, Orono, which started small but is growing, intending to provide a catalog and data base for material including polar-related collections located at the university to be made available for researchers interested in the role of the institution in its history of polar research. Items cataloged to date include books, reprints, maps, carvings, Inuit clothing, expedition sledges, paintings, private journals, oral histories, and more. Links to a data base and catalog are in process and will eventually be made available to the public. The Center is allied with the university's Climate Change Institute, and is under the direction of Prof. Harold Borns (Borns@maine.edu) and Charles Lagerbom, Associate Director (clagerbom@rsu71.org).

For more information, visit the center at http://climatechange.umaine.edu/virtual_polar_resource_center.

American Polar Society Awards

A new addition to the APS website is a complete list of recipients of the Society's Honorary Member Awards and Honorary Service Awards, with the former beginning with General David Brainard and Admiral Richard E. Byrd in 1936 and continuing through 2015, when awards were made at the APS 80th Anniversary Symposium held at Scripps Institution of Oceanography, November 2015. The Society's Awards Committee is Chaired by Captain Lawson W. Brigham, U.S. Coast Guard (Ret.), PhD. Lawson is a long-time member of the Society and himself a recipient of a medal at the symposium. A list of names of recipients is available by clicking on the link to "Officers and Governors and Honorary Members" at the bottom of the APS home page. The medal (pictured) is 2 in. (5 cm) in diameter.

Special awards of two CLERC watches were presented by CEO Gerald Clerc at the Symposium to Dr. Gerald Kooyman and Dr. Jacqueline Grebmeier (p. 7).

APS 80th Anniversary Symposium Booklet

The entire contents of the booklet prepared for registrants at the Symposium is posted on the APS website at the following link, which also follows the presentation of CLERC watches: http://www.americanpolar.org/wp-content/uploads/2015/11/PolarSymposium_4_small.pdf

"From the Ends of the Earth – The Arctic and the Antarctic"

A video consisting of a slide show that photographer Anne Doubilet presented at the APS Symposium at Scripps, 4-5 November 2015, is available at <https://vimeo.com/148922942> (also accessible from the APS website under "Media — Film and Video"). Anne's biography may be found in the Symposium booklet, the link for which is given in the "Symposium Booklet" item above.¶

Changing of the Guard

We are pleased to announce that Lynn R. Everett, long-time member of the APS Board of Governors, has accepted appointment as treasurer of the American Polar Society. Lynn has relieved Ed Varney, who served in this position for close to three years.

Many APS members know Lynn through her association — student to senior administrator — with the Byrd Polar Cli-

mate Research Center (BPCRC) at Ohio State University, Columbus Ohio. Lynn comes fully equipped to the task[s] of treasurer, having years of experience involved in preparing RFPs and associated financial documentation for BPCRC and others at OSU. Please welcome Lynn to her new role for APS and ... pay your dues on time! (Nah, she didn't ask me to say that...) Lynn can be reached at sandcreekfarm21@gmail.com.

Even in a post-recession environment, the financial officer of a non-profit, 501(C)3

organization knows just how fragile and vulnerable these organizations are to anything less than diligent and imaginative execution of their responsibility. APS has been fortunate indeed these past couple decades to have as treasurer two stellar individuals: Dave Baker and Ed Varney. The Society is indebted to both for keeping "the boat afloat," and as Ed leaves office, we thank him, we wish him well, and we hope he remains — as Dave has — an active member of APS. ¶

Updated Membership Statistics

2015 New Members

- Peter Sullivan (ENGLAND) December 2014
- Ron Walker (Atlanta, GA) January 2015
- James Scott (Harstown, PA) January 2015
- Randy Pfutzenreuter (Hecla, SD) January 2015
- Michael Pizzio (Lighthouse Point, FL) January 2015
- Stephen Gonski (Newark, DE) February 2015
- John Harbough (Stanford, CA) February 2015
- Matt Dolan (Sandy, UT) February 2015
- Mary and Rory Martin (Fernandina Beach, FL) February 2015
- Paul Lazarski (CANADA) February 2015
- Robin West (NETHERLANDS) February 2015
- Jason Hicks (Denver, CO) February 2015
- Klemens Puetz (GERMANY) February 2015
- Alex Borowicz (Cedarburg, WI) February 2015
- Chris Srigley (CANADA) February 2015
- John Fonseca (Cameron Park, CA) February 2015
- Timothy Smith (Arnold, MD) February 2015
- Pat and Rosemarie Keough (CANADA) March 2015
- Donna Patterson-Fraser (Sheridan, MT) March 2015
- Alexander Cowan (UK) March 2015
- Richard Marmolejo (Yucaipa, CA) March 2015
- Lauren Farmer (Brooklyn, NY) March 2015
- Amaud Humbert (FRANCE) July 2015
- Eric Zember (Syosset, NY) July 2015
- Brendan Hunter (Traverse City, MI) July 2015
- Pamela Menges (Cincinnati, OH) August 2015
- Joe Hardy (Waipahu, HI) September 2015
- Kevin J. Loewe (Tucson, AZ) September 2015
- Eric Fies (Silver Spring, MD) October 2015
- Steve N. Dulaney (Stayton, OR) October 2015
- Claire Christian (Arlington, VA) November 2015
- Richard Boudreault (CANADA) November 2015
- Adrian Howkins (Longmont, CO) November 2015
- Victoria Merson Pickwick (Siasconset, MA) November 2015
- Boyang "Jack" Pan (La Jolla, CA) November 2015
- Brandy Nisbet-Wilcox (La Jolla, CA) November 2015
- Kelsey Schoenberg (Tehachapi, CA) November 2015
- John Bitters (Olympia, WA) November 2015
- Lee Cooper (Solomons, MD) November 2015
- John Pollock (Seal Beach, CA) December 2015
- Norman Augustine (Potomac, MD) December 2015
- Peter Hemming (Carmel, CA) December 2015

2015 New APS LIFE Members

- Patty Elkus January 2015
- Anthony Fiorillo, Jr. February 2015
- Kelly Kenison March 2015
- Jonathan Knowles November 2015
- Steve Munsell November 2015
- Richard H. Spatz November 2015

APS members and those of the polar community in Remembrance

If someone is not listed who has passed away, please let us know, and we will add them to next year's list to be recognized.

- Dean Richard Freitag, 9/1/14
- Alberto Behar 1/9/15
- Norman W. Langfitt, 1/10/15
- John Richard Claydon 12/15/14
- Captain Pieter J. Lenie 3/1/15
- Captain Robert Farmer
- James Barry Burnham 3/26/15
- John P. "Phil" Strider 4/2/15
- Andrew Jon Hund 4/26/15
- John Charles Preston, Jr. 7/3/15
- William Backalenick 6/7/15
- Gwendolyn Schultz 3/15/14
- Brian C. Dalton 8/31/2015
- John Spletstoesser, 1/25/2016

APS and Symposium Donations: 2014—2015

Amount	Number of donors
\$25,000	1
\$3,000 and above.....	3
\$1,000—\$1,750.....	3
\$500	3
\$200—\$275.....	4
\$100—\$175.....	17
Up to \$80.....	36

Corporate and Foundation Supporters and Sponsors

- **Clerc Watches, Geneva** — \$5,000, two award watches
- **Kane Lodge Foundation** — \$5,000, toward travel expenses of speakers
- **Adventure Canada** — \$2,500

Book Reviews



The Antarctic Book of Cooking and Cleaning

by Carol Devine and Wendy Trusler
Harper Design, 2015, 273pp, \$40

Reviewed by Jeff Rubin

This book is an interesting mixture of memoir, photo album, and cookbook.

The “cleaning” in the title refers to the clean-up at Russia’s Bellingshausen Station on King George Island, undertaken in the summer of 1995-1996 by the VIEW (Volunteer International Environmental Work) Foundation, founded by co-author Carol Devine and Sam Blyth, owner of the late Antarctic tour company Marine Expeditions International (MEI). A series of 13 small groups of paying volunteers travelled on MEI ships to Bellingshausen, where they lived in a borrowed bunkhouse for several days and collaborated with Russian station members to make a small start on cleaning up the vast amounts of rubbish that had accumulated over previous decades: fuel hoses, rusting metal, broken glass.

“Cooking,” however, comprises most of the book. Aside from a few quotes and mention of some grumbling from volunteers questioning the efficacy of their work, we do not find out too much about the VIEW Foundation’s goals or hard-won results (20 fuel barrels of rubbish collected by hand, along with several hundred meters of old fuel hose, removed from the base), nor even how the volunteers lived while at Bellingshausen.

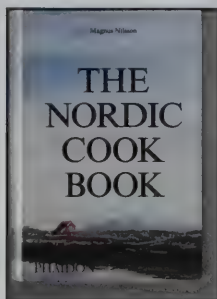
That’s probably because Carol Devine came to Bellingshausen only briefly at the beginning of the summer before returning to the office to handle logistics, while Wendy Trusler was hard at work as the cook in the windowless kitchen at “Canada House,” the small outbuilding the Russians loaned to the VIEW team to use as their headquarters. In Trusler’s diary entries, we read about her interactions with the Russians and their neighbors, her personal thoughts and feelings and, of course, her cooking.

Included here are 43 of her recipes — those I tried are delicious! A few derive from King George Island neighbors (“Great Wall Dumplings” from the People’s Republic of China station; “Cazuela” meat stew from Chile’s Frei base; “Pollo Relleno” from Uruguay’s Artigas station); but most are for the hearty camp fare Trusler served her guests: honey oatmeal bread, roast leg of pork, chocolate chip cookies.

Along with personal photos and black-and-white images of various events in Antarctic history, there are

professionally-produced color “portraits” of nearly all the featured dishes.

The original version of this work was published in 2013 as a limited edition by Vauve Press, a small press created by Devine. It sold out in months, and in 2015 it was republished by HarperCollins. ¶



The Nordic Cook Book

by Magnus Nilsson
Phaidon Press Ltd.
2015, 768 pp., \$49.95, Glossary,
Index, color photographs
ISBN 978-0-7148-6872-1

Reviewed by John Splettstoesser

Magnus Nilsson is an internationally acclaimed chef who, in this book, introduces more than 700 recipes from the Nordic countries of Denmark, Faroe Islands, Finland, Greenland, Iceland, Norway, and Sweden. After a brief Introduction, a Brief History of Nordic Cuisine, and three pages of How to Use this Book, the volume is organized by food type. The author’s personal photographs supplement the text, where appropriate, with scenery of Nordic areas and examples of foods.

The 22 chapter headings include Eggs, Dairy, Vegetables, Fish, Marine Mammals and Seafood, Poultry, Game, Pork, Beef & Veal, Lamb & Mutton, Hash & Minced Meat, Blood & Offal, Sausages, Breads, Pastries, Cakes, and Desserts, plus Basics & Condiments, Jams, and Drinks. A glossary of 10 pages includes terms unfamiliar to many, such as “Pigs Pluck” (lungs, heart and liver of a pig), and the chapter on Drinks includes the term Brennivin, also noted in my article, “Exotic Foods in Arctic Cultures” (page 12 of this issue) and locally called “Black Death” in Iceland, often associated with a common food item called “hákarl” (fermented shark). All of the Nordic countries except Denmark and the Faroe Islands are considered belonging to the “vodka belt,” a region spanning a large part of the northern hemisphere. There have been times of prohibition in most of the countries in the vodka belt. In Iceland, for example, beer was forbidden up until 1989.

Browsing through the book and reading titles of food items reveals a common denominator in most everything related to dairy, meat or fish because of the key words such as “salted,” “smoked,” “fermented,” “marinated,” as examples, perhaps a result of availability of seasonal foods that are preserved for later consumption, and also the lack of refrigeration in certain areas of the far north. My column on “Exotic Foods in Arctic Cultures” in this issue of *The Polar Times* on the various ways in which fish, birds, or

meat can be preserved by fermenting several months to turn uncooked material into a substance resembling a gelatinous mass is common practice in Arctic and sub-Arctic regions. An extension of this practice is the rotten shark delicacy found in Iceland called “hákarl,” fermented shark that is toxic to begin with, but is converted into something edible as a result of proper preparation (p. 240). (“Edible” is a matter of opinion, if you refer to my article.) The food item “kiviak,” common in northern Greenland and also in my visit to Little Diomed Island, Alaska, is a good example of turning birds of the season into a fermented mass sewn into a seal stomach and allowed to form a substance that can be eaten after several months in its entirety — bones, beaks, feet, meat and feathers, best eaten outdoors because of the overpowering odor.

An example of the use to which native animals provide not only food but also other parts is detailed in the heading, “Reindeer and the Sami Culture of the Nordic Region” (p. 292-293). Every part of the animal is put to good use, not just the meat itself, which is either smoked or dried, but the fur for bedding and clothes, and bones and antlers for tools and utensils. The blood is turned into blood pancakes, and the offal used to stuff intestines with sausage and the stomach cleaned and turned into a bag for storage.

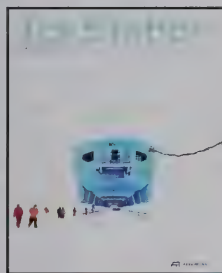
The book is more interesting than it sounds, for the ingenuity involved in preparation of food that extends into the northern regions of Norway, Sweden, Finland, and Russia. A glossary (p. 726 – 735) helps with explanation of words like “Colostrum,” a form of milk produced by the mammary glands of mammals in late pregnancy and the few days after giving birth; and “Cloudberry,” a wild berry native to the Arctic and sub-Arctic regions, rich in Vitamin C and have a particular place of honor in Swedish cooking. The Index (p. 742 – 763) is helpful in finding some of the exotic foods and terms you might find in browsing. The Icelandic rotten shark is not found at hákarl in the Index, but under “Shark” and also “Icelandic rotten shark.” The varieties of “herring” appear infinite and worth checking out, which will bring memories of your travels in this part of the world, where herring seems to be a component of almost every meal. An example of herring with the name *surströmming*, a common food in Sweden, relies not only on fermentation of Baltic herring but also on the can itself. It is widely recognized as the world’s most smelly food and has a huge following — especially in northern Sweden where “sour herring” parties are common.

The fish are fermented in large barrels where the wood itself, after many years of use, inoculates the fish with the right strains of salt-hardy lactobacillus. The fish is usually canned in July and left to ferment in the sun, where *Haloanaerobium* bacteria further ripen the herring into a product vastly different from all other fermented fish products that are not in-can ripened. In some cases, in-can fermentation will have built up enough pressure for the initially flat can to bulge into a pressurized sphere, “to be considered nothing less than a time bomb of olfactory destruction” (p. 198).

It is apparent from many entries in the book that to ensure proper preparation, fermentation is vital, certain kinds of bacteria must be present as part of fermentation, and chemical compounds are additives for some preparations of fish. For example, the

preparation of lutefisk, common in Norway, Sweden, and Finland, includes fillets of white fish such as cod, ling or saithe which is wind-dried or salted and dried, then soaked in a solution of lye (sodium hydroxide), slaked lime (calcium hydroxide), and water (p. 230-231). In summary, Nordic cooking would seem to be nowhere without the use of chemistry and microbiology, along with sufficient time to convert meat and fish into something else.

I recommend the book for casual and serious reading to the gourmet chefs of the world, and also those who are willing to experiment and adapt to foods you will probably never find in your local food markets. ♣



Ice Station: The Creation of Halley VI

By Ruth Slavid
(Park Books, 2015, 96pp, \$29)

Reviewed by Jeff Rubin

Britain's £26 million (NOTE: pounds not dollars!) Halley VI, completed in 2012, is the world's first fully mobile research station. Like the U.S. Amundsen-Scott South Pole Station, Halley VI can be raised on its hydraulic legs to deal with the annual snow accumulation of 1.2 meters that buried and crushed four of its predecessors, the first of which was completed in 1959. Halley V was dismantled and removed from the continent.

Because Halley VI is on skis, it can also be towed to a new site — a critical feature due to its location on the Brunt Ice Shelf at 75°S, where the ice shelf is 130 meters thick and flows toward the Weddell Sea at the rate of 400-700 meters per year.

This book, with 100 color photos and 20 detailed line drawings, gives a good overview of Halley VI's challenging design and construction. Its seven modules, each colored blue, along with one red central module, are raised 4 meters above the ice and lined up like train cars perpendicular to the prevailing winds, which can reach 150 km/hour.

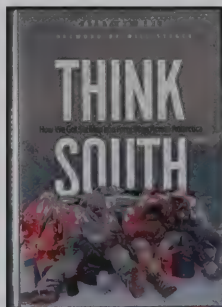
Halley VI can accommodate 32 people in 16 twin bedrooms (some of the 70 summer personnel are housed nearby). Each of the 16 winterers, who spend 14 months at the station, gets her/his own room. Features, including bedside lights that can be programmed to wake residents with a simulated dawn, aim to make the station as comfortable as possible. Although the bedrooms are small, each has a window.

The two-story central "social" module, named for Robert F. Scott, contains a dining room, kitchen, TV lounge and gym/music room. Its spiral staircase is lined with Lebanese cedar to stimulate the sense of smell. But the climbing wall was nixed by health and safety reviewers due to its proximity to the bar (com-

plete with dartboard and pool table).

"Huge crack forces early move for Antarctic base," *New Scientist* reported on 5 December 2015: a prominent crack called Chasm 1 — more than 50 meters deep, 30 km long and 1 km wide in parts — now threatens Halley VI. It formed 30 years ago but remained dormant until 2012.

The crack, extending about 1.7 km a year, is 8 km away from the base, so a move is planned. Bulldozers needed to tow the modules will be brought in by ship in the coming months — assuming it can get through the heavy sea ice common here. If all goes to plan, relocation to the other side of Chasm 1, perhaps 20 to 30 km away, will take place next year. But the new site will bring logistical challenges, since it's further from the coast and all supplies arrive by ship. ♣



Think South: How We Got Six Men and Forty Dogs Across Antarctica

by Cathy de Moll
Foreword by Will Steger
St. Paul, Minnesota
Historical Society Press, 2015
xi + 282 pp., \$24.95
ISBN: 978-0-87351-988-5

Reviewed by John Spletstoesser

From the book title, and the foreword by Will Steger, you might think that Will has published a sequel to his book, *Crossing Antarctica* (by Will Steger and Jon Bowermaster, published by Alfred A. Knopf in 1992). You would be partly correct — this is a sequel of sorts, but by a different author. Cathy de Moll has published a book some 25 years after Will's 1989-90 expedition to provide details of how it all worked ... if a bit off the original plan and timetable. Nevertheless, the expedition became a success, with worldwide attention.

You might think that the content of *Think South* would reveal all the gory details of personality clashes among the six men from six different countries; whether the expedition was poorly planned; if there were glitches in timely supplies by aircraft for placing fuel caches in critical locations at critical times; and so on. Some of those would be accurate.

Still, Will's choice of expedition members — and Cathy — was about as good as was possible to achieve. Cathy de Moll was executive director of the 1990 International Trans-Antarctica Expedition and, after reading her book, I can say that the expedition would not have succeeded without her management and attention to detail — all that without actually setting foot on the continent. Her efforts included tying

together the negotiators, the pilots, the diplomats, the sponsors, and the photographers who accompanied the expedition at various times, plus generally providing the means to plan at a time when the Soviet Union (a major player in the details) was about to dissolve into individual states. By her own definition, Cathy has been a teacher, communications executive, writer, and entrepreneur. That combination more than qualified her for dealing with emergencies as they arose, negotiating with government officials at the highest levels, and making deals (a good way to put it!). I was remotely involved with the expedition because of the timing of a program called "Antarctica Institute," for K-12 teachers, in which I was lead scientific instructor and organizer. The "institute" was held on the campus of Hamline University, St. Paul, Minnesota, in one-week events in 1987-89. One of the objectives of Will's expedition was directed to education relating to environmental issues that might affect Antarctica, should exploitation begin as a result of the Antarctic Treaty reaching a critical year during which a ban on mining might be overridden by Treaty Parties. That part of the story is worth reviewing in other literature sources, as it is still an issue that will come up for review in 2041.

Here is a quick review of what happened, and when, to help to guide the reader through this book, which depicts Cathy's trials with issues you wouldn't have thought could occur — but did.

1988 — Expedition rations packed in Minneapolis; **1989** — Expedition left Minneapolis for Cuba and on to Antarctica; **July 26, 1989** — Expedition began at Seal Nunataks on the Larsen Ice Shelf, eastern side of the Antarctic Peninsula; **7 November 1989** — arrived at Patriot Hills in the Ellsworth Mountains; **11 December 1989** — arrived at the Geographic South Pole, where a U.S. station had been built in 1956-57 and continuously occupied since then; **18 January 1990** — arrived Vostok Station, a Soviet Station with the ominous record of the lowest surface temperature recorded in the world, on 21 July 1983 (minus 129°F, minus 89°C); **3 March 1990** — arrived Mirny Station, Soviet station on the coast and end of the crossing of the continent.

Distance traveled: 3,741 miles in 220 days. Check the map [in the book] for the route.

What did all this mean, and why do it?

Will's earlier expeditions in the Arctic paved the way to realize that a crossing of Antarctica was possible, and when he met with the co-leader/organizer Jean-Louis Etienne, a French doctor, planning began that led to adding the missing parts, starting with Geoff Somers (U.K.), who had worked in the Antarctic Peninsula and knew the area. Then were added three more from other Antarctic Treaty signatories (which further denotes the international aspect of the expedition). Handling of sled dogs was vital, and Will had much experience in that regard, as did some others. Skiing and glacier travel were important. Qin Dahe, the glaciologist from China had never been on skis, but eventually learned, as well as learning how to handle dogs. Victor Boyarsky, the Russian expedition member who joined them, was vital for dealing with his countrymen at Vostok and Mirny and was also an experienced trail person; and there was also an expedition member from Japan, Keizu Funatsu, a hard worker and dependable, who became lost in a blizzard near the end of the expedition crossing and was found in an anxious search by team members.

I leave to the reader of Cathy's book for details on

the men, the dogs, and the hardships they had to overcome, in addition to the politics of somehow making it all work. I suspect that Cathy used some of my philosophy for achieving success with the people you work with: "Let them win the little ones, as long as you win the big ones." I gather from her story that she won most of both, little and big.

Reading her book, including both some of the incidents and mentions of the geography encountered, brought back many memories, so I was aware of some of the events in Cathy's book, as I was when I read Will's earlier volume. I have been to all the places mentioned in the book, beginning with the Larsen Ice Shelf where the expedition started out; the Ellsworth Mountains, where I worked as a geologist during two summers; the South Pole and Vostok Station, where I did some glaciology projects with a Russian and a Dane; and finally, Mirny Station, which I visited via tour ship. There are many differences between my years in Antarctica, summers only, and Will's (mine without the responsibility of handling dogs).

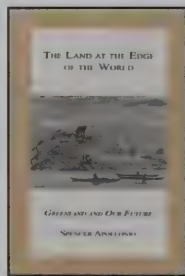
A side event occurred when I visited Rothera Station, a British base on an island next to the base of the Antarctic Peninsula. While in a chat with a dog handler there, I was introduced to Sawyer, one of Will's dogs from his expedition. I heard that Will sent the dog out of the field because it was not performing at maximum capacity. Would that ever have applied to any one of the six expedition members in the field? Doubtful, as all performed as a team, no one became ill, and apparently, all got along quite well. (Switching tent partners from time to time is helpful to avoid any personality conflicts, which I have also discovered in my own history in the field.)

Would Will or anyone else think about conducting such an expedition in future? No reason to, as once should be enough to claim the record. Dogs are no longer allowed in Antarctica, since a ban in April 1994 declared a potential risk due to transfer of dog distemper to wildlife such as Antarctic seals. In addition, the Larsen Ice Shelf, the starting location in 1989, isn't there anymore, part of it having broken up and drifted away as icebergs, a likely sign of climate change (warming) in the Antarctic Peninsula. Rather than provide a detailed listing of brushfires and confrontations that Cathy de Moll experienced while managing the expedition from her base in Minneapolis, I can summarize by saying the book must be read to realize the magnitude of what she accomplished.

Her book contains numerous photographs from the expedition, as well as some depicting events prior to and afterward, all in black-and-white; but her website at <http://www.cathydemoll.com/thinksouth> includes several color photos from each of the 14 chapters.

As compensation for my minimal contribution to the educational aspects of the expedition, I received an album of 72 color photos, some in black-and-white in the book and some in Cathy's website. This was a gift

from the expedition office, autographed by Will, a colleague who I sometimes traveled with when we were both lecturers on tour ship cruises in Antarctica. ¶



The Land at the Edge of the World: Greenland and Our Future

by Spencer Apollonio
Montgomery, AL: E-Book Time, LLC, 2014.
ISBN: 978-1-60862-551-2, \$16.95, 272 pages

Reviewed by Charles H. Lagerbom

"Could any place be handsomer than Greenland?" Such a statement from an eye-witness regarding the magical and mysterious island known as Greenland sets the stage for Spencer Apollonio's newest book *The Land at the Edge of the World: Greenland and Our Future*. Published by E-Book Time in Montgomery, Alabama, Apollonio treats us to a collection of 19th and 20th century narratives of Greenland, as its status slowly evolved from European colony to semi-autonomous province towards independence in the 21st century. Between W.A. Graah's 1837 lyrical descriptions of the place to H.J.C. Schurmann's 1976 political account of the evolving colonial administration and inter-relations of Greenlanders and Danes, Apollonio takes us on a narrative tour-de-force as explorers and scientists and inhabitants share their perceptions of the place in their own words and their own context. We hear from such polar historical notables as Elisha Kent Kane, F.L. McClintock, Charles Francis Hall, Isaac Israel Hayes, Sir George Nares, Adolphus Greely, Otto Sverdrup and Fridtjof Nansen. Their impressions and perceptions written with the literary flair of their times reveal an astonishing array of descriptions, but with the common theme of unquestionable wonder and awe of the land and its beauty. Apollonio has used care and a knowledgeable background in choosing his line-up of contributors and the specific passages they used. Each one was like a little jig-saw piece that, when combined, contributed an entire visualization of Greenland, her people, her history and her place in the far north. Spencer Apollonio is author of *Last of the Cape Horners: Firsthand Accounts from the Final Days of the Commercial Tall Ships* (2000) and *Lands that Hold One Spellbound: A Story of East Greenland* (2008). ¶

OBITUARIES

Edgar L. Andreas

Edgar L. Andreas was born on 6 December 1946, in Sterling, Illinois, and died on 30 September 2015.

He graduated from Sterling Township High School in 1965 and from Knox College in Galesburg, Illinois, in 1969 with a B.A. in physics. He earned an M.S. in physics in 1971 from Michigan State University and a PhD in physical oceanography at Oregon State University.

Andreas was hired in 1978 as a research physicist at the U.S. Army's Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire. At CRREL, he had two notable Antarctic "firsts." In 1981, he was a member of the Weddell Polynya Expedition, which made the first deep penetration into the Antarctic ice pack and was the first time that American and Russian scientists worked together in Antarctic sea ice.

In 1992, Ed was the lead American meteorologist on the American and Russian Ice Station Weddell, the first research ice camp ever deployed on drifting Antarctic sea ice. It floated northward for four months, paralleling the track of Ernest Shackleton's legendary *Endurance*, the first human visit to this remote area in the 75 years since Shackleton's epic adventure. Additionally, Ed participated in several expeditions to the Arctic and traveled extensively throughout the world.

In 2007, he began work as an owner and principal investigator with NorthWest Research Associates, Inc., of Redmond, Washington. In his Lebanon, NH, office, Ed continued his research on turbulent processes over sea ice, the open ocean, and land surfaces. Over his scientific career, he published over 125 scientific papers and edited or co-edited three books.

He received the Antarctica Service Medal, the Army's Research and Development Achievement Award, and an award for Distinguished Technical Communication.

He was a Fellow of the American Meteorological Society and the Royal Meteorological Society.

Louise Crossley

Louise Crossley was the kind of person who exhibits leadership and who made things happen. She passed away on 15 July 2015 in Australia where she made a name for herself in a number of significant arenas. She was born in Johannesburg, South Africa in 1942, led a remarkable life full of high achievement driven

by her curiosity, exploration and passion for the natural world and the people around her. She grew up fiercely independent, having been sent to boarding school in England at four years old. She earned a science degree at the University of Cambridge in 1963, married, and moved to Australia, where she earned a PhD in 1980 in the history and philosophy of science at the University of New South Wales. She was a leader, a great traveler, and a person who made things happen around her, from her days as project manager at the Powerhouse Museum in Sydney in 1981 to the Commission for the Future, to the Australian Antarctic Division, and more recently her work to help establish the Australian and Global Greens.

In recent years, she came to prominence as a strong campaigner for Tasmania's forests, especially those on Bruny Island where she had built a yurt and a place where she could relish the wild. She loved the Antarctic and was a pioneer as station leader at Mawson Base in 1991, only the second woman in Antarctica to lead a base. Later she spent two seasons on Macquarie Island and became very involved in the pest eradication program there. Her idea of leadership in Antarctica was that women seem to be good at it — cooperative, collegial, and not leadership by command, but to encourage those around you to work together as a team. After leaving the Antarctic Division, she worked as a lecturer on several voyages to the Antarctic and never lost her passion for the ice, the wildlife and the Southern Ocean. She authored a book (*Explore Antarctica*, 1995) for the general audience with an environmental theme. In the 1990s, she settled in Tasmania and turned her attention to politics. She was the first convener of the Tasmanian Greens, stood as the Greens senate candidate in Tasmania in 1988. She brought her great intellect to the challenge of global warming and not only helped research on the subject but writing on it. She traveled the world by bus, train, ferry, and freighter until eventually arriving in Sao Paulo, Brazil for the second Global Greens meeting. She loved the Tasmanian Symphony Orchestra, and the joy that music had brought her throughout her life.

I am speaking for many of my colleagues who knew Louise when she was a lecturer with us on tour ships in Antarctica, in my case on the Russian icebreaker *Kapitan Khlebnikov*. Her enthusiasm about Antarctica was very evident in her manner and style of lecturing, showing herself as a talented teacher that inspired the audience. — **John Splettstoesser**, modified from *The Mercury*, August 3, 2015

James E. Heg

Captain James E. Heg, USN (Ret.), 95, passed away 21 November 2015. He was born on

15 December 1919 in Kent, Washington, and attended Everett High School (class of 1938), where he lettered in football and track.

Following studies at the U.S. Naval Academy, he served on the submarine USS *Bang* in the Pacific during World War II, earning the Bronze Star.

He served in the Navy for 31 years, retiring as Captain, and then joined the National Science Foundation, Washington, D.C., as Chief of Polar Planning and Coordination in the Office of Polar Programs.

He moved home to Seattle in 1975.

Mount Heg (72°57'S, 166°45'E) on the west side of Malta Plateau in Victoria Land is named for him. — **From *The Herald* (Everett, Washington) 20 December 2015**

Arthur E. Jorgensen

Arthur "Art" Jorgensen, aka "Red Jacket," was born on 21 January 1933, and passed away on 20 October 2015 at age 82 at Hilton Head Island, South Carolina.

After high school, Art's interest in meteorology studies was piqued by his meteorological training while serving in the navy during the Korean War and by his self-described "Norwegian sea-faring heritage."

Following his naval years, Art furthered his studies of meteorology and climatology at Rutgers University in New Brunswick, New Jersey. While a junior in college, Art applied and qualified to become a member of a military and civilian team that became one of the first groups to winter over at the South Pole, and he spent a full year stationed there. The year-long study was the Antarctic phase of the International Geophysical Year (IGY) program of 1957-1958. Art served as meteorological aide with 17 others to spend a year at the Amundsen-Scott South Pole Station. Highlights of Art's year spent at the Pole included a close camaraderie he shared with his fellow crew under very harsh weather conditions. The lowest temperature recorded was negative 101.7°F on June 19, 1958.

Art's crew welcomed the arrivals of several dignitaries, most notably Sir Edmund Hillary and Sir Vivian Fuchs as they participated in a joint British New Zealand expedition (Commonwealth Trans-Antarctic Expedition, 1957-1958). Art's personal highlight was having raised the second Norwegian flag to fly at the South Pole since Roald Amundsen had done so in 1911. Art's mother, Anna, had obtained the flag from the United Nations building in New York City. After his return, Art graduated from Rutgers University and settled for 53 years in New Jersey to raise his family and later moved to

Hilton Head Island in 1989.

Jorgensen Nunataks is named for Art, located at 83°43'S, 164°12'E, in the Queen Elizabeth Range.

He was a proud member of The Antarctic Society. — **Modified from *The Island Packet*, 5 November 2015**

Olav Helge Loken

Olav Loken, a name well known in the field of polar sciences, was born in Ålesund (Aalesund), Norway, on February 23, 1931, and died in Ottawa, Canada, on September 18, 2015. He studied at the University of Oslo and spent more than a year as a glaciologist at Wilkes Station, Antarctica, in the International Geophysical Year (IGY), 1957-58. Carl Eklund, Station Leader at Wilkes, proposed the feature Løken Moraines for Olav (with the Norwegian spelling) at 66°17'S, 110°37'E. Olav then came to Canada to study at McGill University where he received a Ph.D. degree in Geography in 1962. Two years later he was elected a Fellow of the Arctic Institute of North America. After teaching at Queen's University, he joined the Geographical Branch of the Department of Energy, Mines and Resources (EMR) in Ottawa in 1964. Over his 26-year government career he did much to advance Canadian Arctic science, through extensive fieldwork and a variety of management and policy roles in EMR and the Department of Indian and Northern Affairs. After retiring from government he worked with the Canadian Polar Commission, promoting Canadian involvement in Antarctic-related research. He was a passionate cross-country skier, and loved the outdoors. (*John Splettstoesser*, from *The Ottawa Citizen*, September 22, 2015.)

One of the best ways to know Olav properly is to include here a letter from Dr. Richard L. Cameron, who spent the winter at Wilkes Station and obviously formed a life-long friendship with Olav. Following is a paraphrased letter that Dr. Cameron sent to Inger Marie, Olav's wife, on hearing about Olav's passing.

"Dear Inger Marie: I have so many fond memories of Olav that I thought I would mention a few. Olav and I met in the summer of 1953 when he and I were field assistants of Olav Liestol [Norwegian glaciologist]. Your husband was the experienced student of glaciers and I was a newcomer. We first went to the Svartisen Ice Cap [Norway] and worked for a week or so. Olav and I had fun dislodging erratics that had been left on a sloping granite area that ended in a tarn, watching the boulders roll downhill and crash into the lake. After completing the observations there we went down to the Jotunheim. After a pleasant stay at Besseggen,

we crossed the Memurubu Glacier to Spiterstulen. We crossed the glacier roped together. Olav led and said "When I begin to break through a snow bridge over a crevasse, you pull back on the rope"... which I did several times. We went on to meet Liestøl at Storbreen where we finished the season.

In 1954 I worked with Valter Schytt [Swedish glaciologist] in Greenland and in 1955 in Sweden on the results of the Greenland work and did field work in Tarfala [research station in northern Sweden]. Late in 1955 I was asked if I wanted to work in Antarctica in the IGY. I said yes, and immediately asked Olav if he would like to go as well. Somehow or other, he received the message, even though he was washing dishes on some ship going around the world. He said yes, and jumped ship in Baltimore. He had to go to Canada to be readmitted to the U.S. Afterward, Olav and I left for Seattle to board the U.S. Coast Guard icebreaker Northwind, leaving for Antarctica on November 8, 1956.

The year we had at Wilkes was a wonderful experience, and the success of the glaciological program was largely due to Olav's enthusiasm, innate ability, and knowledge." RLC

Fernando L. Maldonado

Fernando L. Maldonado, age 92, of Concord, Massachusetts, died 28 September 2015. He was born in Cordoba, Argentina on 11 June 1923, attended schools in Argentina, studied law at the University of Cordoba, and moved to the United States in 1948. In the 1950s Mr. Maldonado was a Travel Industry Executive working with Argentine Airlines.

In the early 1960s he joined the founding team of Lindblad Travel, the pioneer in luxury adventure travel. He directed scores of tours to exotic locations including Russia, China, Afghanistan, Outer Mongolia, and the Sahara desert. Mr. Maldonado also accompanied the first tourist trip to the Antarctic in 1965 [sic, 1966], on the Argentine naval vessel *Lapataia*, arranged by Lindblad Travel of New York, one of the highlights of his career.

He also lived in Cairo for a time, directing Lindblad business throughout Egypt, and later worked for another leading travel company, Abercrombie and Kent, directing its sales operations in the New England region, until his retirement. — **Modified from *The Concord Journal*, October 2015**

George D. McLaughlin, Jr.

George Doane McLaughlin, Jr. (Retired LtCol USMC), 81, was born 15 June 1934, and passed away in Morehead City, North Carolina, on 8 November 2015. He served in the Vietnam

War where he received the Distinguished Flying Cross; Air Medal with Numeral 13; Combat Action Ribbon and he also flew during the siege at Khe Sanh. His flying career included VXE-6 in Antarctica as a pilot of LC-130 aircraft in the early 1970s.

After he retired from active duty he worked as assistant director of flight services for AT&T. He retired to Emerald Isle, North Carolina, in 1993 where he continued to serve as assistant chief with the Emerald Isle Rescue Squad and on the planning board for the town of Emerald Isle.

John Arthur "Jay" Morrison

Jay Morrison was born on 25 July 1954 in Cleveland, Ohio, and passed away on 11 June 2015.

He grew up in Shaker Heights, Ohio, and graduated from Hawken School before becoming a citizen of the world to travel, explore and find adventure.

His exploits took him to all seven continents, including four stints in Antarctica and numerous sailing adventures in the Mediterranean, Pacific, Caribbean and Atlantic. He served as second mate on the US Antarctic Research Vessel *Hero*, as a crew member on the National Geographic-sponsored "Rowing to Antarctica" expedition (featured in that magazine's January 1989 issue), and as chief engineer on the National Geographic-sponsored Sol expedition across the Pacific Ocean to Antarctica. Jay also wintered-over at the US Amundsen-Scott South Pole Station in Antarctica, as the power plant engineer responsible for maintaining all life sustaining systems.

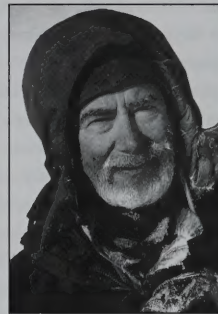
Jay assisted in the start-up of the Biosphere II in Tucson, Arizona, contributing specifically to supporting and adjusting the new passive solar system and an onsite natural gas energy center.

To pay for his education, Jay worked as a night shift truck mechanic and worked several seasons as a commercial fisherman off the coasts of Washington, Oregon, Alaska and California. He received a BSME degree from California Polytechnic State University (San Luis Obispo, CA) in 1984.

Always committed to renewable energy sources, he held and cultivated a special interest and expertise in hydrogen as an alternative power resource. Jay finished his career with a 14-year stint as a Controls Field Engineer for General Electric, performing installation and commissioning of new, and services on existing, power plants, specializing in controls and advanced technology, domestic and international. This job took him all around the world, allowing Jay to apply his engineering feats of daring while immersing himself in the cultures and languages

of 13 different countries. He was competent in three foreign languages. A quiet, modest, brilliant man, with a playful sense of humor and keen perceptive abilities, he lived life fully and chose his own path every step of the way.— **Cleveland Plain Dealer**, 15 to 21 June 2015

Joseph E. Murphy



Joe Murphy was a man of many parts. He was an explorer who climbed mountains in every continent, a certified financial analyst, an author of a wide variety of five books, and a philosopher

who roamed the world. Joe was born in Minneapolis, Minnesota, on March 13, 1930, and died in Minneapolis on August 10, 2015. He received an undergraduate degree from Princeton in 1952, enlisted in the U.S. Army, selected for Officer Candidate School, and served as a Second Lieutenant in the Second Cavalry in Japan. From Japan, Joe and a friend from Princeton (with whom he founded its Mountaineering Club), set out to make the first ascent of Istor-O-Nal in the Hindukush, Pakistan, on June 8, 1955, a climb of 24,288 ft (7,403 m) that left him with frozen toes, later amputated. In later years, Joe worked in the banking business in Minneapolis, where he was a pioneer in the application of computers to financial analysis. Joe led three American mountaineering expeditions to Tibet, including the North Face of Everest in 1986. His polar experience included skiing to both the North Pole and the South Pole. The latter is documented in his book "*South by Ski to the Pole*," Marlor Press, 1990. I have included here a partial review of Joe's book as a means to show his personality and other traits of a true adventurer.

Joe's spirit of adventure led him to join the expedition that included a mix of people from various backgrounds – nine men and two women – who pioneered a new route to the South Pole in the 1988-89 austral summer, and several firsts, including the route that started on November 17, 1988, from the Ronne Ice Shelf near Patriot Hills in the Heritage Range of the Ellsworth Mountains, and the first Americans to reach the South Pole by ski, the two women being the first women ever to reach the South Pole overland at that time. The expedition reached the South Pole on January 17, 1989. As they approached the station, a line was

formed that would preclude any one of the 11 members to be first.

A colleague of mine who thrives on Antarctic trivia, told me that one of the 11 was the 100th person to reach the South Pole overland since the historic firsts in 1911-1912 of Amundsen (party of 5), Scott (party of 5), and "Footsteps of Scott" (1985-86 – party of 3, led by Robert Swan). There were also tractor traverses to the South Pole prior to 1988, so the numbers get complicated, but Joe could have considered himself as the 100th, although I don't think he ever knew—or cared.

I met Joe Murphy at a conference on Antarctica at Hamline University, St. Paul, Minnesota, where I was lead scientific instructor and organizer of an event for K-12 school teachers designed to acquaint them with the continent that was traversed by Will Steger and his Trans-Antarctic Expedition, 1989-90. The conference consisted of a one-week course for each of three years, 1988-90, and Joe appeared at the conference to give me a copy of his book on his South Pole skiing expedition in the 1988-89 austral summer. He talked about his earlier thoughts on being a field member of the team. His age (58), cost (\$70,000, with no sponsors), and the fact that his only skiing experience was cross-country in the Minneapolis area, was not enough to deter him from what might be the only challenge left in life. He mentioned his mountaineering experience, loss of toes (I wondered why he walked the way he did), and the fact that he wondered whether his team members and their diverse backgrounds would result in a successful venture. My quick impression of Joe pertained to his calm demeanor and eyes that looked like he had just reached the summit of a mountain.

Joe's book gives some idea of the diversity of his trail mates. Of the two women (p. 3), one, a Harvard divinity student, was "looking for God in the Antarctic" — she is presently (2015) President of a U.S. theological University — "the other, a California blonde, had appeared in *Playboy*, wrote romantic poetry, and pursued fame." (In later years, a good friend of mine, who has traveled the world with her husband in their adventure tourism business.) There was also a flamboyant Indian colonel with a black mustache

"who kept telling us we were doing it all wrong (sometimes, he was right)." I won't go further with Joe's descriptions of the others on the team, leaving it up to readers of his book to see what Joe was up against in the 53-day skiing trip. I know three of the guides who accompanied the 11 skiers, all experienced in mountaineering and polar travel, and able to take care of the novices they were leading to the South Pole, but Joe didn't know that at the time. — **John Spletstoesser, modified from *Minneapolis Star Tribune*, August 13 and 23, 2015**

Alfred Wright Stuart

Alfred Wright Stuart was born November 16, 1932 and died on November 1, 2015 in Charlotte, North Carolina, where he was Professor Emeritus in the Department of Geography and Earth Sciences at the University of North Carolina at Charlotte. He retired in 1999 after thirty years of service on the faculty at UNC Charlotte, including 17 years as chair of the Department of Geography and Earth Sciences. During his tenure he was principal in the publication of over 20 books, numerous journal articles, and technical reports, including the *North Carolina Atlas*, originally published in 1974, with a new edition in 2000.

He and his colleagues pioneered new ways of making highly complex information accessible and compelling. He often described himself as an "academic journalist," and valued honest, direct communication in every aspect of his professional and personal life. A native of Roanoke, Virginia, he completed his first two years of college at the Virginia Military Institute before transferring to the University of South Carolina. After earning his BS degree with a major in geology from South Carolina in 1955, he entered the graduate program at Emory University, where he earned his MS degree in geology in 1956. After finishing at Emory, he went on active duty in the United States Army, where his education and training enabled him to serve in Greenland with a civilian research team. This experience sparked his lifelong passion for and interest in both polar regions.

In 1958, Stuart joined an international team

of researchers to take part in the Victoria Land Traverse (VLT) of 1959–1960, to explore an area of northern Victoria Land and adjacent Wilkes Land that had never been previously seen. [See book review of the VLT by John Weihaupt and others, *The Polar Times*, July 2014, p. 33.]

Stuart's work and exploits are chronicled in two books and many articles, including a large feature article in *National Geographic* magazine, and commemorated by a mountain named in his honor. (Mount Stuart – 1,995 meters/6,545 feet — is in the Monument Nunataks, 73°33'S, 162°15'E.)

After returning from Antarctica in 1960, his academic interests turned to geography, and he earned a PhD in that field from the Ohio State University. After a stint as a city planner in Roanoke, he joined the geography faculty at the University of Tennessee-Knoxville, where he served from 1964 through 1969. — **Modified from *The Charlotte Observer*, 4 November 2015**

Contents

APS President's Message	2
Membership Letter	2
American Polar Society Symposium	3
Medals and Certificates Awarded	8
Global Warming Hiatus a Puzzle	9
Greenland is Melting	10
Due North: Exotic Foods in Arctic Cultures	12
Shackleton's Icebound Survival Story	15
Coast Guard to Finalize Icebreaker Acquisition Strategy By Spring	16
Obama Aims to Add Arctic Icebreakers	17
Dinosaur Species That Lived Above Arctic Circle	18
Enormous Mounds of Methane Found Under the Arctic Sea	19
Woolly Mammoths Likely Died Out on Remote Island	19
A Cub Named "Lucky"	20
Study Shows Polar Bears Don't Enter Hibernation	21
Inside Polar Bear Hair	21
Scientists Hail Climate Pact as Key Step	22
Dire Implications in Greenland Ice	23
What's New on the APS Web Site?	24
Changing of the Guard	25
Updated Membership Stats	25
APS/Symposium Donations 2014-2015	25
Book Reviews	26
Obituaries	28

About Our Covers

- **Front cover:** In honor of this, the 80th anniversary of the American Polar Society, we offer this colorized reproduction of our first cover from 1936.
- **Back cover:** This watercolor painting, titled "Iceberg Reflections #1" and measuring 15x22 inches, is by artist David McEown of Vancouver, Canada (www.davidmceown.com). He painted it after a 2008 visit to Scoresby Sund, Greenland, where he observed some "fantastic icebergs." The painting was presented to APS President Fred McLaren and his wife, APS supporter Avery Russell, by Denise Landau on behalf of the members of the APS during last November's Symposium in La Jolla, California. The same painting was also presented in absentia to John Spletstoesser, outgoing Board of Governor chair and APS past-president.



"Iceberg Reflections #1," watercolor, by artist David McEown